Anke Bahl | Agnes Dietzen (Eds.)

Work-based Learning as a Pathway to Competence-based Education

A UNEVOC Network Contribution

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▶ Researching
▶ Advising
▶ Shaping the future

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▶ Foreword

Work-based learning (WBL) is increasingly recognised by Member States around the world as an effective strategy to promote quality and relevance of education and training. The UNESCO Recommendation concerning Technical and Vocational Education and Training (TVET) was approved in 2015 and reflects the Member States' collective aspiration. This aspiration is grounded on the improvement of the learning process essential to raise the quality of TVET and increase the relevance of training to the signals of the labour market. Work-based learning, in the many forms by which it has evolved through time, is a strong reflection of the potential for employment of young people in a country, the effectiveness of multi-level governance of TVET, and importance attached to creating a well-rounded learning process suitable for future employment and personal growth. Whether it is in the form of apprenticeships, industry attachments, on the job training or in-service training, WBL, as advocated by UNESCO, should be linked with institution-based learning, where the understanding of the scientific, technological, social, cultural, environmental, economic and other aspects of societies could deepen, in addition to developing competencies of individuals to prepare them for occupation fields.

WBL can vary significantly from one country to another, based on prevailing education and training pathways and traditions. Advancing WBL models effectively therefore requires an understanding and adaptation to country-specific contexts and cultural traditions.

With the involvement of UNEVOC Centres from around the world, this book contributes to the analysis of different dimensions and characteristics of WBL in different contexts and gives a global perspective on WBL as a pathway to delivering competency-based education. It is the result of a collaborative research project led by the Federal Institute for Vocational Education and Training (BIBB), with support of the UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training (TVET).

Global TVET partnerships are vital to tackle global challenges in a world changing at a fast rate. Through its activities, UNESCO-UNEVOC fosters capacities, knowledge development and peer learning, including on the topic of work-based learning. UNESCO-UNEVOC connects TVET actors across the world to help create a new value using what we know as existing modes of practice and generate transformative ideas that help knowledge building, lesson learning through sharing of comparative experiences and inspiring promising practices.

Through international dialogue, the UNEVOC Network plays an important role in exploring possible strategies and implementation frameworks that suit local conditions for work-based learning to succeed in different country contexts across Member States. As the

largest network of TVET institutions, the UNEVOC Network facilitates the exchange and co-operation of more than 250 institutions from about 160 Member States, and therefore constitutes a strategic resource for work-based learning and other aspects related to TVET. The present volume represents an example of international knowledge mobilised to enhance a collective knowledge.

We thank all UNEVOC Centres and experts from outside of the UNEVOC Network for their contributions to the present volume. BIBB, as a UNEVOC Centre and lead partner for this work, has supported the goals of the UNEVOC Network. Its support is highly appreciated.

We hope that the implementation of relevant findings in this field will facilitate access to decent work for young people and better support adults through their working life around the globe. I hope the present volume has a significant relevance in raising the bar of work-based learning research.

Shyamal Majumdar
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▶ Foreword

The papers brought together in this anthology aim to make the potential of work-based learning better known worldwide and inspire its continuing development in research and practice.

Enhancing work-based learning is an objective of equally great importance for the Federal Institute for Vocational Education and Training (BIBB). The German vocational education and training system is increasingly well-known abroad for being built on the foundations of the duality of vocational school and business, and attaching overriding significance to learning in the course of work. Originally, German vocational education and training practice goes back to the training and qualification practices of the medieval guilds. In the course of industrialisation and the emergence of the nation state, these apprenticeship practices were gradually professionalised and supplemented with school-based provision. We see the combination of in-company training and vocational school education as a successful model for both meeting the qualification needs of businesses and ensuring the individual's access to skilled occupations and employability.

The company as a learning venue occupies a central position for initial vocational education and training and was anchored as such in the German Vocational Training Act of 1969. With the exceptions of Austria, a few Swiss cantons, Denmark and Luxembourg, it is only in Germany that in-company training, experiential learning leading to an occupational qualification, and socialisation in the company command such a strong relevance and reputation for the standardised form of initial vocational training regulated in public law.

The training contract binds the trainees to a company where, as members of its workforce, they are gradually familiarised with the "adult world of work". Within the company, young people not only acquire practical skills and abilities but are "socialised" into working life. They are introduced to the world of work and their occupation, gather experience working alongside their colleagues, learn to manage their own work capacity, and find their place within the organisation of the company. Over a period of three to three-and-a-half years, young people not only gain a standardised formal qualification in the education system but simultaneously grow into loyal and aware employees.

After initial vocational training, work-based learning has been established as a routine and goes on to play an important part in the acquisition of further qualifications like the Master Craftsperson's certificate. Thanks to the provision of upgrading training to qualify as a Master Craftsperson, Certified Senior Clerk or Technical Engineer, the German dual system incorporates a second, higher tier of qualification, the standard of which bears com-

parison with many vocationally-oriented Bachelors' degrees in other countries. By virtue of their practical bias, their familiarity with company work processes and their accordingly vast applied knowledge of their occupations, skilled workers with these qualifications act as a pivotal "hinge" between initial vocational training and academic degrees. Skilled workers on this so-called intermediate qualification level are the connecting link between vocational and academically qualified employees, and are vital to the innovativeness of German industry.

This traditional approach to securing a skilled workforce, involving both the company and the vocational school, currently enjoys great international prestige and interest, and BIBB receives inquiries from all parts of the world requesting support in the development of similar forms of initial vocational training. In Germany, however, the sustainability of the dual VET system is itself under scrutiny. A key challenge for German industry is the shortage of skilled workers that is already being felt in many sectors. Due to demographic change, it is becoming ever more difficult for companies to recruit sufficient junior workers to meet their needs. At the same time, the young generation's education patterns have noticeably shifted insofar as today's school-leavers are increasingly turning to academic qualifications.

Parents place enormous value on their children staying on at school to attain the *Abitur*, Germany's highest school-leaving certificate from the general education system. The number of school pupils holding a higher education entrance qualification is rising. The year 2013 was the first in which more than 50 per cent of a year group were *Abitur* holders. By no means all of them subsequently embark on a university degree programme. Nevertheless, as a result there are fewer high-attaining young people available for and interested in a dual programme of initial vocational training. Companies are now competing more fiercely for suitable applicants, which works to the detriment of small and medium-sized enterprises (SMEs). Yet these SMEs still represent the very backbone of German industry.

Irrespective of the declining number of young applicants, expectations remain high when it comes to the level of subject-matter knowledge in the 327 dual training occupations that currently exist in Germany (BIBB, 2017). In the wake of advancing globalisation and digital-isation, rising demands are being made of the competences of skilled workers, and stronger analytical and problem-solving skills are now prerequisites. For new knowledge to be trans-formed into innovations, however, there is also a need for specific experiential knowledge acquired in contexts of application, which can only be developed in practice-based learning situations.

These various social and technological developments in Germany ultimately lead to a paradox: on the one hand, companies as learning venues in the dual system of vocational education and training are becoming an increasingly scarce resource. In particular, smaller companies, which often perform highly specialised service processes, are finding themselves almost too stretched to maintain their initial vocational training activities. On the other hand, amid globally accelerating competition, work-integrated learning is gaining a growing degree of significance. School-based and state-regulated provision cannot respond as rapidly and flexibly to technological change as in-company training that is strategically well-inte-

grated into enterprises' business processes. This is not only true of initial vocational training, but especially also of continuing education in the workplace.

This makes it all the more clear that German industry is dependent for its innovativeness on highly qualified skilled workers from the vocational education and training system with company-based, skilled-occupational backgrounds.

In view of this challenge and the uncertainty of forecasts of the future demand for skilled workers, both the vocational and the academic qualification system in Germany are currently in the midst of a major structural change. Systems which used to be rigorously separated historically are now gravitating strongly towards one another – partly as a result of the Bologna reform within European education systems.

Many enterprises have consequently developed dual or cooperative degree programmes at Bachelor level in cooperation with universities of applied sciences, seeking in this way to attract applicants for whom an academic training would also be attractive. Meanwhile universities are looking for ways in which to redirect their expertise in abstract, theoretical knowledge towards a more practice-based curriculum by means of elements conferring occupational qualifications. An abundance of new dual or "hybrid" degree programmes are currently emerging, which aspire to combine the respective strengths of both systems of qualification. In this context, a linchpin function is ascribed to dualised forms of learning and competence-oriented curricula.

In contrast to classic higher education programmes, these forms of provision, which are in very high demand among young people, are distinctive for their greater relevance to practice. Further characteristics are the two learning venues of the university of applied sciences and the company. Occupational practice is closely interwoven with programmes of studies on both organisational and curricular levels. In the format known as the integrated-training degree programme, initial vocational training in a skilled occupation is combined with a Bachelor's degree programme so that young people ultimately obtain two qualifications.

It remains unclear how, in the medium and long term, these shifts in the education system and the new qualifications arising through improved crossover between initial vocational training and higher education will stand the test of time in the labour market. Perhaps with the dual study courses and improved transfer of credit for competences acquired on the vocational track, a broad transitional zone will be created between vocational and university-based training – a German dualised form of academicisation, as a possible further facet and additional level of the dual VET system.

All that is certain at the present time is that the company as a learning venue will remain strategically significant for Germany in future. This conclusion gives rise to concrete research questions, which BIBB is currently tackling with its various partners on different levels.

The quality assurance of in-company initial and continuing vocational education and training is one of our core themes. How must work be designed in order to maximise its learning content and support the individual's competence development? For the purpose of assuring the quality of in-company training, ideal jobs are those where the job description is

sufficiently broad to permit individual flexibility and creativity without being too complex. Work tasks must be pitched in terms of challenge and volume so that they neither overload nor undertax the employees concerned, but spur them towards creative solutions. On the other hand, the necessary time and space must be given for focused reflection on their own actions so that any lessons can be learned.

A further issue to be addressed is the recognition of the learning outcomes arising from this process. For traditional initial vocational training this is largely settled, whereas we still lack established procedures for subsequent career-wide in-company vocational learning and the recognition of vocational competences towards higher education programmes. How can learning outcomes that fall beyond the bounds of existing and known educational qualifications be systematically recognised? And how can individual, maximally adaptable vocational career-progression models be facilitated whilst maintaining transparency of qualifications in the labour market?

This anthology and the preceding workshop, which was held jointly with UNESCO-UNEVOC in Bonn in June 2017, are examples of how – despite the diversity of education systems – future questions of vocational education and training can usefully be discussed at international level. Against the backdrop of our specific experience in Germany, one of our major concerns as a German member of the UNEVOC network is to draw lasting attention to the role of present and future research about "work-based learning".

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Prospects

Anke Bahl, Agnes Dietzen, Keshawna Salmon–Ferguson, and Michael Schwarz

▶ Introduction

The promotion of work-based learning as a key element in any TVET strategy is high on the political agenda these days. The success and widespread use of the term, though, might partly be due to its vagueness. Its meaning ranges from "experiential" or "informal learning" in the workplace itself to "learning-on-the-job" and "work-related learning" in explicitly vocational contexts and TVET institutions. Work-based learning (WBL) seems to be a panacea for all kinds of educational and economic challenges. Some voices highlight its potential to raise the economic competitiveness of employers, sectors and whole nations, others to enhance young people's transition from school to work and as a cure for youth unemployment, and still others stress its role as a significant parameter in individuals' career development. The research on the evidence and practice of work-based learning is rather diverse, too. A number of recent books and articles document this variation with regard to different research questions, empirical scopes and the methods applied (cf. references at the bottom).

The background of this publication is a common initiative of the UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training and the German Federal Institute for Vocational Education and Training (BIBB) as a member of the UNEVOC Network. Both strive to offer a platform for the promotion of further networking and collaborative work between TVET institutions and research partners worldwide. UNESCO-UNEVOC and BIBB invited scholars from the UNEVOC network and beyond to gather for a two-day workshop event on 22/23 June 2017 in Bonn, Germany, and to look more closely into the research about work-based learning. The purpose was to take a collective look at research initiatives from different regions in the world and to support the members of the network in creating knowledge and evidence of useful research approaches with regard to meeting their TVET objectives.

The thematic frame of the workshop was derived from the results of an extensive prior literature review of the current state of research on WBL in TVET contexts on a global scale. National as well as international studies had been identified and mapped in order to gain a picture of the notion and scope of work-based learning, and the strengths and weaknesses of TVET research in this field as well as its geographical distribution. The results of the study show a high diversity of notions, practices and existing approaches, which nevertheless rely on a number of salient common aspects:

- ▶ WBL means learning for work, learning at work and learning through work.

- ▶ Learning subjects of WBL embrace not only pupils and students in formal education and training (initial VET, continuing VET or Higher Education) but also employees in companies and any other institutions involving paid work.

- ▶ WBL takes place in schools and colleges as well as in companies.

- ▶ Learning targets and outcomes of WBL are knowledge, skills, and attitudes. Their purpose is to develop professional, social and personal competence. These are important prerequisites for employability, identity formation and social integration.

- ▶ Knowledge, skills, and attitudes are developed through a reflected process of participating in work tasks in a dynamically evolving professional setting.

- ▶ Guidance from tutors and senior colleagues increases the learning potential of WBL.

- ▶ The particular strength of work-based learning lies in the acquisition of practical skills and competences.

- ▶ WBL supports the transfer and application of codified disciplinary knowledge into work situations. Furthermore, it helps to cope with demanding professional situations.

- ▶ The character of WBL can be formal (structured and intentionally planned), informal (not highly structured and planned) and incidental (happening unintentionally).

All these aspects relate to a concept of learning which is almost globally understood as a *competence-based perspective on vocational education and training* and thus corresponds very well with the aims of the UNESCO TVET strategy. Furthermore, a competence-based research perspective also proves to be a useful frame of reference for reflecting and discussing WBL within an international context. It affords a focus on individual learners and their learning conditions while acknowledging changing intensities of engagement in their career and professional development. It also allows reflections on the forms and scope of WBL along a continuum from informal to formal institutional settings across different regional TVET systems and local practices.

Based on this perspective and the body of research already available, a number of themes have been identified that are generally up for discussion in any endeavour to make better use of the potential of work-based learning. These range from research issues like the identification of conducive factors for learning on the level of the individual subject and the work environment to an analysis of options for the transfer of knowledge, skills and competences between contexts. With regard to the enhancement of learning in the world of work and employment, the exploration of learning opportunities in the workplace is an important step in awareness-raising and a prerequisite for the creation of learning environments at work. Furthermore, the nature of guidance and counselling available from tutors, fellow workers and instructors has to be understood in order to guarantee effective use of their role and

contribution in WBL. The curriculum development for WBL schemes that link the learning in companies with that in schools and institutions of higher education is another important field of activity in the context of WBL. Finally, yet importantly, questions of upgrading informal practices of work-based learning and developing formally recognised standards are at stake. How can workers' knowledge be recognised and certified?

All these themes touch upon essential elements in any VET strategy, regardless of particular characteristics of educational systems and local and regional practices. Accordingly, we sent out a call for papers enumerating these themes to a selected group of researchers and experts in VET all over the world. The response was very positive and we received many interesting paper proposals.

Apart from introductory keynotes dealing with the notion of competence in global TVET on the one hand and workplace practices supporting learning at and through work on the other, the workshop presentations contributed mainly to the following overall themes:

a. Conducive factors for learning on the level of the individual subject and the work environment
b. Curriculum development for WBL schemes in schools, companies and institutions of higher education
c. The role of tutors, fellow workers and instructors in WBL
d. Boundary crossing: Transfer and recognition of knowledge, skills and competences

This book documents the papers received as a follow-up to the workshop presentations and ensuing discussions. It starts with opening words by the Head of UNESCO-UNEVOC and the President of BIBB as well as this introductory overview to the joint project.[1]

Setting the frame for a global perspective on learning

In Part I of this book, the two keynote speakers of the workshop, Martin Mulder and Stephen Billett, set the frame of reference for the overall theme of WBL as a pathway to competence-based education. From a general perspective on learning, Stephen Billett introduces central concepts and premises which are essential in understanding and appraising workplaces as environments for learning. He considers various kinds of curriculum already implicit to occupational practices, describes pedagogic practices arising through engagement in work activities and shows examples of learners' epistemological practices. Martin Mulder addresses competence-based education (CBE) as a common framework and approach for

initial and continuing vocational education and training in a global perspective. He reviews the origin of the competence construct, its systemic features and underlying theoretical approaches. Based on his long experience in the field of VET development and cooperation, he explores a number of lessons learned for policy and practice.

Conducive factors for learning on the level of the individual subject and the work environment

The contributions of the next part reflect central questions, such as how workplaces and work environments differ in their potential to support the learning of their employees. Why are some learning spaces more suitable than others, and what individual and what context factors play an influential role for retrieving the potential of work-based learning?

Alison Fuller and Lorna Unwin suggest a co-production approach to develop work-based learning programmes better tailored to the specific circumstances of both employers and VET providers. This relies on a conversation between employers, work-based learning providers and learners, and makes use of analytical tools to enable them to co-produce the types of learning experiences and environments that will foster the development of occupational expertise. To derive the skill needs of the employees, the demands of the specific work process need to be examined. Then, the "Expansive-Restrictive Framework" can be used to clarify the options for WBL on a continuum from 'expansive' to 'restrictive'. It provides questions for exploring the actual workplace characteristics at the general level of the productive system, concerning structural features such as employment relations, and on the micro level involving everyday interactions and relationships among employees. The answers provide a solid basis for understanding the motives and needs of the employer. For the tailoring of an appropriate programme, Fuller and Unwin also underline the crucial role of teachers and trainers in translating concepts and applications from work processes into curriculum materials and teaching/training resources.

Christian Harteis reflects on digitalisation and its effects on the world of work by looking at the levels of technology, of organisation and of the individual workers and employees. To realise a successful transformation of work, good workplace learning practices will be key. He draws attention to individual characteristics that influence this learning, such as cognitive, motivational and emotional factors, as well as to organisational work conditions concerning job demands and job control. His research agenda addresses the interplay between work environments and individual characteristics from the viewpoint of supporting or hindering opportunities for learning and competence development. Arguing from a self-reflective stance on behalf of the educational sciences, he underlines the huge need to investigate and understand the transformation processes and their side effects in order to adequately prepare the individual. Invoking the traditional humanistic perspective of educational research, he calls for active engagement in the digitalisation discourse.

Quality assurance is a topic of very great relevance for VET. In German apprenticeship, quality is associated with the learning outcome of high vocational competence. An open

question, though, is how to assess the quality of work-based training. As a result of their empirical research, Stefanie Velten and Annalisa Schnitzler present a questionnaire ("Inventory of Company Training Quality", IBAQ) to evaluate the quality of initial company-based training in a reliable way. Following occupational psychology, they argue that employees' behaviour and attitudes are primarily affected by the way they experience their job characteristics and underline the importance of social interactions for learning. Hence, the developed tool focuses on self-reported work characteristics perceived by the apprentices themselves instead of supervisors' evaluations of the work and training environment or characteristics that seem to be more 'objective'.

Curriculum development for work-based learning schemes

Part III addresses processes and challenges of curriculum development for WBL schemes in different educational settings and from different international perspectives. Rendering learning more relevant to labour market needs and professional profiles in terms of learning content and didactic approaches is vital for both companies and educational institutions. Analysing work-relevant skills and practices is an essential first step in the process of developing curricula.

Starting from a traditional practice of distinctively separate teaching content in Chinese VET institutions – e.g. theoretical courses based on disciplinary knowledge on the one hand and operational technical skill training on the other – Zhiqun Zhao and Yilu Shen reflect central stages of curriculum development towards Competence-Based Education (CBE) in China. A number of curriculum approaches adopted from abroad - and based on diverging premises - influenced this national development. While reflecting on the "Developing a Curriculum Method" (DACUM) that is in prevalent use in the USA, and the German learning field approach designed around occupational tasks identified by expert workers in the dual VET system, they explore the challenges of adopting and evaluating these approaches for Chinese VET institutions.

Georg Spöttl and Gert Loose argue from the background of an established qualification research framework that is suggested to be applicable to a diversity of regional VET contexts. While describing the main steps of their method, they recommend a development procedure rooted in work-process analyses and founded on a collaborative effort of instructors and work experts involved in designing flexible programmes and learning approaches. The approach considers both regional and sectoral business structures and analyses the respective qualifications and competences required of skilled workers accordingly. Spöttl and Loose have already applied their method in a number of projects in the international context. Their experience enriches the discussion on curricula development within a global frame.

The following contributions in this part provide rich insights into a variety of challenges of implementing WBL schemes in the context of Sub-Saharan Africa (SSA) and Nigeria in particular. Traditional apprenticeship practices are the most prevalent form of WBL in a large number of African countries and are usually strongly intertwined with the informal econo-

my. These communities of practice are mostly self-regulating systems relying on personal contacts and networks, and therefore of limited scope with regard to professional recognition and career prospects for the individual. The challenge is how to embed these practices of informal, community-based learning into a formal education system and acknowledge this particular kind of learning without destroying its essence.

Benjamin A. Ogwo not only provides fruitful examples of collaborations between formal TVET programmes and informal sector enterprises but also an overview of general trends with regard to WBL and its policy in SSA. Starting from exemplary intervention projects funded by regional and international donors in different regions of Nigeria, he explores types and characteristics of informal, non-formal and formal WBL. He indicates research issues relating to each type of WBL in order to improve practice and provide evidence that may guide adequate policy measures.

Benadeth N. Ezekoye raises gender issues in higher TVET in Nigeria and the particular challenges girls and women face when they wish to enrol in these usually male-dominated programmes. Providing guidelines to ensure gender sensitivity on behalf of policy and practice, she explores the subsequent steps from curriculum design to its implementation and evaluation based on a teacher-training programme that combines school and industry placements for its students. Ezekoye provides examples of good policies and practices for effective networking of higher education institutions, VET institutions and industries, and calls for active engagement of all stakeholders in VET in order to achieve equal opportunities for women in WBL programmes.

Finally, Salim Akoojee addresses the dilemma of learning in the informal sector as such, and how research and policy might tackle it. While much is known about the extensive nature of the informal economic sector, relatively little is understood about training in and for this sector. To improve this, it is essential to first acknowledge the huge diversity of this sector and understand its local, regional and sectoral peculiarities. Akoojee argues that the approach and notion of work-based learning could provide a supporting frame of different forms of informal learning practices in African countries. This would help to advance more institutionalised forms of learning and their essential incorporation in national systems. Nevertheless, he insists that researchers need to tailor their policy recommendations to fit the specific causal scenarios in different regions and localities.

The role of tutors, fellow workers and instructors in work-based learning

Guidance and support both from colleagues and supervisors or even appointed trainers have proven to be crucial for the effectiveness of WBL. Peers and senior staff in the workplace help to develop the confidence that is necessary for any employee to grow and learn. There is a huge variety of roles and functions involved in facilitation processes in the workplace, with a lesser or greater degree of visibility.

The contribution by Claudia Jacinto and José Pozzer provides a bridge between the previous section focusing on WBL schemes and the challenges tutors face when they get in-

volved in these programmes. Jacinto and Pozzer neatly compare the features of two internship schemes and their respective stakeholders in Argentina. While *Vocational practicums* are a scheme advocated by the Ministry of Education and aim at gaining some practical work experience as a compulsory element of secondary TVET school education; *On-the-job trainings* receive support from the Ministry of Labour and are intended as transition programmes for disadvantaged and unemployed young people to help them enter the labour market. In both cases, two tutors are part of the scheme although their institutional affiliations, professional backgrounds and roles are quite different. While there are distinct differences between the educational and labour logic driving the search for adequate work placements and their subsequent supervision, the results reveal that many policy lessons can be learned if these usually quite separate institutional worlds enter into systematic dialogue.

Since learning opportunities in the workplace depend on both the organisation of work and good relationships, growing attention in the global skills debate is given to the role and contribution of in-company trainers. While the attractiveness of their job and enhancement of their competences have become major issues of concern for VET policy, little is known about the challenges trainers actually face in their role. Anke Bahl presents results of extensive case studies in a variety of German companies providing apprenticeship training in the dual VET system. By analysing the personal beliefs and accounts of a variety of employees carrying out training, she sheds light on the inner dynamics of the training task and suggests viewing it less as an educational than a social practice.

Peter Rushbrook presents two research projects with pragmatic workplace learning outcomes for the professional development of VET personnel in Singapore. The first dealt with diverging beliefs of adult educators in workplace and institutional settings about what is meant by "quality curriculum". After identifying two contrasting approaches, the corresponding reflection resulted in a model for enhancing curriculum quality by posing questions for reflection that encourage a learner-centred approach. The second project investigated the strategies of both freelance and employed staff in VET to maintain their personal learning and teaching skillsets. The results illustrate how learning opportunities are shaped by and dependent upon one's particular occupation, work conditions and personal motivation. An educational programme was set up to support educators in developing their portfolios and better navigating the world of freelance or casualised employment.

By drawing on his vast cumulative empirical research in Australia and three studies in particular, Roger Harris presents many insights in the types of support available to learners in the workplace and how it is influenced by personal, organisational and sectoral characteristics. Informal workplace trainers provide different forms of guidance than formal trainers; VET teachers who are not situated within the enterprise are in a different position again from 'insiders'. Hence, one study investigated more closely the practices of VET staff from public educational institutions working in and with private enterprises. To gain legitimacy in the enterprise they had to learn how to meld their interventions with the regular patterns of work. Harris characterises this as a process of transfer in which both knowledge and context

are being altered. He calls for more research into the corresponding "third space" created by these "learning brokers" between the contexts of education and work, thus building a bridge to the next thematic section.

Boundary crossing: Transfer and recognition of knowledge, skills, and competences

Learning always occurs in concrete learning spaces and environments, be they located at school, work or other less institutional contexts. Contexts play an important part in knowledge creation and development, while boundaries are an important condition for learning and identity formation. For lifelong learning however, it is essential to be able to transfer one's learning outcomes within and between the contexts of education and work. The concept of "boundary crossing" refers to an investigation of learning at work in which learners develop and use their knowledge and skills across different contexts. Part V sheds light on the interplay between learning, working and personal spaces on the one hand, and the blurring of boundaries between educational institutions, private businesses and research institutions on the other.

Natasha Kersh analyses the experiences of further education tutors in work-related settings in the context of the United Kingdom. She employs the concept of recontexualisation of skills and knowledge to explain how learning and applying skills across a variety of contexts happens. Relating to these conceptional deliberations, she reviews the empirical results of a number of her projects dealing with issues of boundary crossing and knowledge transfer. She focuses on the ways college tutors use different types of knowledge in their teaching practices. Her interviews reveal that they perceive teaching as a constructive and co-constructive process requiring continuous boundary crossing between past and present experiences. The knowledge and skills they primarily draw upon are subject-specific knowledge, personal skills and work-related skills. Acknowledging the resulting, mostly tacit, skills could help to shape working environments for tutors that help them to further deploy their teaching practices.

How can educational institutions and companies support both students and employees to learn at the boundaries of social practice i.e. learn through boundary crossing? Loek Nieuwenhuis, Aimee Hoeve, Wietske Kuijer, and Annemieke Peeters address boundary crossing and the potential of WBL at the intersection of private businesses, higher education and regional innovation in the Netherlands. WBL not only supports the entry of students to the labour market and underpins lifelong learning activities but can be used to connect knowledge development in enterprises to knowledge development and research at the universities. A triple helix model, consisting of education, innovation of practice and practice-based research, is scaffolding both students' education and the innovation of professional practice. The authors present their design principles for "innovative work-based learning" based on their experience with some pilot programmes initiated in the field of healthcare and its professions. "Sparkcentres" serve as innovative hubs at the edges of education and work where

students, faculty staff and professionals encounter workplace problems that are complex, and need different perspectives to find workable solutions.

The section ends with a contribution by Carolin Böse, Agnes Dietzen and Christiane Eberhardt, who address boundary crossing as moving from informal to institutional frameworks for acquiring competences and for their validation and recognition in the German VET system. Since the German system of vocational qualifications is highly regulated, skilled persons without a corresponding certificate have only poor options for integration into the German labour market. Several intervention programmes are currently being carried out to solve this dilemma. Böse, Dietzen and Eberhardt explore three approaches; two of them already enable the recognition of informally acquired competences. A third one is gearing up to establish such a procedure with a view to giving access to the skills of a recognised occupation, and to improved employability as a result. A central part of the contribution focuses on the role of certificates as essentials when it comes to valorising learning outcomes from informal contexts, and on challenges for a formal VET system when a parallel recognition pathway is added.

Prospects: A research agenda for new policy challenges

This book provides a heterogeneous collection of research and practice perspectives around central topics in the field of work-based learning. Some regional practices have been analysed in great detail, others have been sketched more broadly. Both the particularity of each context and situation as well as the similarity of certain challenges at the edge of education and work become apparent. The very last contribution, by Borhène Chakroun from UNESCO, provides an analysis of the current policy debate towering above all these many local and regional developments. Wondering about the broad consensus with regard to WBL and its potential for very diverse economic and social challenges, he calls for a multi-disciplinary approach and evidence-based research to better inform this debate. He launches four broad open research questions and pleads for a shift from mainly economic and productivity perspectives to a sustainable development paradigm.

The bibliography at the very end of the book is meant as a general overview of central books and papers on work-based learning around the globe. It does not contain an exhaustive list of the literature used by the collected authors of this volume, but a list of cited references is provided at the end of each paper.

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Part I:
Setting the Frame for a
Global Perspective on Learning

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▶ Securing Occupational Capacities through Workplace Experiences: Premises, Conceptions and Practices

1. Learning through occupational practice

Throughout human history, across continents and cultures, the vast majority of occupational capacities have been secured through experiences in workplaces and through means quite distinct from what occurs in educational institutions. In particular, these capacities have been learnt by workers, rather than being taught by others (Billett, 2014b). To understand how learning arises through workplace experiences, however, requires particular explanatory premises about, and conceptions of, this phenomenon. These need to be based on workplaces as learning environments, not those that are used to explain the practices and outcomes of educational institutions. All this is important because there are significant lessons to be learned in addressing contemporary concerns about the initial preparation of occupational capacities, and also those associated with learning across lengthening working lives. Fundamentally, one of the key differences in these discussions and explanations is that this learning and advancing of occupational practices have risen through processes primarily associated with individuals' mediation of their experiences, and not through teaching (Webb, 1999). Importantly, these processes of human learning and innovation have been essential for human survival and the progress of human cultures (Donald, 1991; Jordan, 1989), and are likely to be in so the future.

Throughout this history, local workplaces have been the common sites for this learning in Europe (Greinert, 2002), India (Menon & Varma, 2010), Japan (Singleton, 1989) and China (Ebrey, 1996), Greece (Lodge, 1947), Mesopotamia (Finch & Crunkilton, 1992) and other countries. So these processes have commonly been central to humanity and have addressed human needs across diverse cultures and continents. Indeed, in Europe, family-based occupational preparation was only displaced by industrialisation (Greinert, 2002), a development that has been repeated elsewhere. The available evidence suggests this learning has largely arisen through individuals' participation in occupational practice, their mediation

of what they experience, and through a process referred to as mimesis (Byrne & Russon, 1998) or mimetic learning (Billett, 2014a): that is, arising through processes of individuals' active engagement (i.e., observation, imitation and practice) and meaning-making, rather than by being directly mediated by experts, teachers, mentors or masters. All of this can be difficult to comprehend within contemporary schooled societies, in which experiences in and through educational institutions are privileged and universally engaged with, to the degree that teaching and learning often become seen as synonymous. Such a view would be inconceivable prior to the era of modernity and industrialisation.

Consequently, it is important to identify and articulate premises and concepts which can explain how this learning occurs to audiences who are immersed in the premises and precepts of schooled societies. Proposing premises and concepts that are distinct from the orthodox makes it more important to be clear about how we should understand and appraise workplaces as learning environments, through carefully introducing, discussing and advancing these precepts. These elaborations, importantly, also offer bases to consider how the securing of occupational capacities can progress in contemporary times: practices that can be enacted and engaged in currently in workplaces. Drawing on anthropological, historical, psychological and sociological disciplines, considerations of the kinds of curriculum, pedagogic and personal practices supporting learning through work are advanced here. Firstly, models of workplace curriculum are explained and illustrated as pathways along which to progress. Then, some examples of practice pedagogies are elaborated as a means of augmenting experiences in work settings, directed to secure particular kinds of knowledge. These are nothing more or less than affordances, and their efficacy in supporting learning is premised on the personal epistemological practices of those who participate in, and learn through, the circumstances of practice. In this way, securing occupational capacities through work is realised and can be promoted through this combination of means: practice curriculum and pedagogies, and workers' personal epistemologies.

1.1 Apprenticeships – a first case

To explore the point being made it is worth considering the case of apprenticeships. Currently, most people are likely to see apprenticeships as a model of education in which a more experienced occupational practitioner closely guides the development of a novice (i.e., an apprentice). Throughout history, however, apprenticeships have mainly been a mode of learning (Billett, 2016). They have only relatively recently become a model of education, with the formation of modern nation-states and industrialisation, and they have become institutionalised in particular ways and differently across nation-states. Whilst much is made of the German dual system, for instance, this is only a comparatively recent model. Essentially, throughout most of human history, apprenticeships have comprised the process of occupational formation through learner engagement and construction (Webb, 1999). The word 'apprenticeship' has its origins in the French term *apprehender* – that is to – apprehend knowledge or to seize knowledge, or as suggested recently, the apprentices need to steal knowledge

because is not made accessible to them (Marchand, 2008). To take another instance, the Japanese term for apprentice is *minarai*, "literally one who learns by observation" (Single-ton, 1989) and in this tradition "it is expected that serious learning will proceed unmediated by didactic instruction. *Minarai kyooiku* describes an education which relies on principles of learning through observation ….. Yet, it is the apprentice who has to discover even this" (Singleton, 1989, p. 26).

In this mode of learning, it is apprentices who are responsible for working out what and how they need to learn, and they even have to learn that they have these roles. It is also worth noting that this mode of learning is enacted interdependently, rather than independently. That is, it arises through apprentices actively interacting with others, the workplace and with artefacts associated with their work. The anthropologist Jordan (1989) identified this process of learning through observation in her study of Mexican birth attendants. She concluded that:

> Whatever the origins of the didactic mode, it has always been a minor mode of knowledge acquisition in our evolutionary history. In the West, however, the didactic mode of teaching and learning has come to prevail in our schools to such an extent that is often taken for granted as the most natural, as well as the most efficacious and efficient way of going about teaching and learning. This view is held despite the many instances in our own culture of learning through observation and imitation (Jordan, 1989, p. 932).

Of course, there were educational institutions before modernity. But they were only for a tiny minority of the population, often the elite. Even there, it seems teaching as we know it did not feature strongly in these educational provisions (i.e., *yeshivas*, *madrassas*). So, even in educational institutions before modern times and before the requirements for mass education, direct teaching seems to have been a rarity.

2. Explaining learning through work: premises

As such concepts go in some way against much orthodox understanding, it is important that some explanations are advanced. These are four-fold.

Firstly, the knowledge required to be learnt for performance at work comprises the occupation's domain-specific conceptual, procedural and dispositional knowledge and these have:

▶ canonical (i.e. occupational) and

▶ situational (e.g. workplace) levels.

The canonical knowledge is that which would be expected of all individuals who practice an occupation, and are often captured as statements of professional competence and goals and content for educational programs. Yet, beyond the canonical are the specific requirements of

particular workplaces that require a situated manifestation of that occupational knowledge. So, what a mechanic does in an inner-city dealership may be quite different than a mechanic working in a small country town or regional centre. Individuals construct this knowledge as personal domains of occupational knowledge from their engagement in their work activities. Their personal structuring of that knowledge will be shaped as occupational domain specific:

▶ conceptual knowledge – 'knowing that' (Ryle, 1949) (i.e. occupational concepts, facts, propositions – surface to deep conceptual knowledge) (Glaser, 1989),

▶ procedural knowledge – 'knowing how' (Ryle, 1949) (i.e. how we achieve goals through thinking and acting (both specific – strategic occupational procedures) (Anderson, 1993; Sun, Merrill, & Peterson, 2001),

▶ dispositional knowledge – 'knowing for' (i.e. values, attitudes) related to occupational and situated instances of practice (Perkins, Jay, & Tishman, 1993), including criticality.

Respectively, these three forms of knowledge represent what we know, can do and value.

Secondly, there is no separation between engaging in activities, such as work, and learning (Lave, 1993). When we engage in everyday goal-directed activities we are also learning micro-genetically or moment-by-moment (Rogoff & Lave, 1984). When we undertake tasks that are familiar to us, we refine and hone, albeit sometimes highly incrementally, what we already know, can do and value. When we engage in activities that are new or novel to us, we generate new knowledge and structuring of knowledge and, potentially, ways of knowing. Moreover, the activities and interactions in which we engage change constantly. Across all kinds of social settings, our activities are generative of learning, albeit of different kinds and innovations as we revise them. As people engage in their work activities they therefore learn and build on what they know, and what they value. Importantly, that process also comprises the remaking of occupational tasks, as individuals engage in work activities in particular settings and respond to specific problems (Billett, Smith, & Barker, 2005). Most frequently, that remaking is about adapting what we know to changing circumstances. However, it can also be transformational when novel responses are required for emerging problems or workplace tasks. So, as we engage in work activities, there are two legacies: learning and the remaking of occupational practices.

Thirdly, the knowledge that needs to be learned arises from these interactions, yet is itself also a product of history, culture and situation. That process of accessing, engaging and remaking that knowledge occurs in is referred to as the inter-psychological, between the person and the social world. What is suggested here is that that inter-psychological process is characterised by interdependence (i.e., the reciprocal engagement between individuals and the world in which they engage).

Fourthly, the richness of these learning processes is premised on the duality between the kinds of interactions and activities that individuals are afforded, on one hand, and on the

other hand, how individuals elect to engage with them (Billett, 2001b). This is the duality which comprises workplace performance and individuals' engagement.

These affordances can be seen as being four-fold, and a programme of research has identified how they make contributions to learning through everyday work activities that have been identified to include:

i)   engagement in work tasks ('just doing it') – legacies of goal-directed activities (cognitive and socio-cultural constructivist accounts),
ii) indirect guidance provided by the setting ('just being there') – observation and imitation (cognitive and neuro-science accounts),
iii) practice within that setting – practise, rehearse, refine and associate (cognitive accounts of procedural and conceptual development), and
iv) close guidance (proximal) by other practitioners and experts – assisting the development of knowledge that cannot be learned through discovery (Billett, 2001a).

However, it is incorrect to view affordances as always being constructive and helpful in shaping the required occupational practice. Evident in this list is the key role played by the learners. Three of the four contributions here are largely mediated by the learners, with only one – close guidance – being premised upon others' mediation of individuals' learning. The key emphasis within these contributions is the active engagement of learners. The same programme of research also identified limitations of learning through practice through what has been afforded by workplaces. These include:

▶ learning that is inappropriate (i.e. bad, unhelpful knowledge and perilous ways of doing things),

▶ lack of workers access to work activities and workplace guidance,

▶ workers not understanding the goals for performing tasks,

▶ reluctance of experienced co-workers/experts/supervisors to provide guidance to workers,

▶ absence of expert guidance in the workplace, and

▶ reluctance of workers to participate effortfully in learning (Billett, 2001a).

So, what is afforded workers – what is provided for them and what they are able to experience – can be either support or inhibit what can be learned through everyday work activities.

It follows then that improving learning in the workplace necessitates trying to secure or enhance the contributions listed firstly above, and attempt to redress the limitations also listed here. In the next section, consideration is given to how workplaces can be effective learning environments through curriculum and pedagogic practices, and the personal epistemologies of learners.

3. Practice curriculum, pedagogies and epistemologies

The practice curriculum comprises sets and sequencing of experiences through which individuals' progress in learning about their occupational practice. In fact, this relates back to the original meaning of the word 'curriculum' which refers to the 'course' or 'pathway to progress along', as it comprises the sequence of activities that learners progressively and incrementally engage in as they develop their occupational capacities. Pedagogic practices are activities or interactions that can enrich and augment learning arising from experiences in work settings. Note that the term 'pedagogic practices' is used to go beyond teacherly processes and include those that arise through engagement in work activities, interactions and with artefacts such as partially completed jobs. An important element of workplace pedagogic practice is that this kind of support enables learners to access knowledge that they would not be able to discover on their own. Yet, these pedagogic practices are quite distinct from those enacted in classrooms. Then there are learners' epistemological practices which comprise the basis on which individuals engage with, construe and construct knowledge through practice (Billett, 2009). These are a product of individuals' personal histories – their repertoire of engagement in activities and interactions across their lives, and how these practices come to shape the ways in which individuals engage with what they have learned in their workplaces, and how they learn from that process.

These three foundational components of learning through practice are likely to be enacted in tandem in most work related activities. To illustrate these foundations and how they play together, consider the example of a medical student (Billett & Sweet, 2015). Sue is a third year medical student and she engages in a Longitudinal Clinical Placement within a medical practice in a small town in regional Australia. For the first six weeks, she works alongside a doctor in her consulting room, largely observing how the doctor goes about her work. Along the way, Sue asks questions and the doctor provides explanations and sometimes questions Sue about her knowledge. Throughout this period the learning is based on mimetic processes of observation, engagement and some practice. Being assigned to this doctor also means that Sue visits a hospital where the doctor also works, and she comes to observe medical work in that environment. After six weeks, Sue is given a consulting room next to the doctor. Then, with the consent of patients, she engages in history taking and examination and arrives at conclusions about patients' health and likely remedies. At this point, the doctor engages to check the information as soon as it is gathered and also to check the basis of Sue's prognosis. These then are elements of practice curriculum: the progression along the sequence of activities that incrementally assists in developing the learners' capacities to enact their occupation. Through this process, Sue engaged actively and authentically, again through mimetic processes, taking a greater amount of decision-making, all of which is constructed on developing what she knows, can do and values about medical practice. Later, Sue wanted to know how to take blood from patients. From her experiences at the local hospital, she was able to identify a nurse who was competent in taking blood. She then observed this nurse and

engaged in episodes of practice so that she became competent in taking patients' blood. In this way she exercised the processes that she had been subjected to, observed, imitated and then practiced. These steps are all elements of mimetic learning.

As can be seen, Sue exercised her personal epistemologies in constructive ways. That is, she asked questions, engaged intensively and then was able to participate in procedures that allowed her to gain information and then make clinical decisions. Along the way, she also developed a range of procedural capacities and, for instance, her decision to approach the hospital indicates the importance of agency interest. Beyond that, Sue actively engaged with the local community. Rather than returning to her home on weekends, she elected to stay and live in this town and join the local church and the tennis club. In this way, she engaged with the community and her health care colleagues, which then allowed her to seek advice from the hospital and engage with hospital staff. Indeed, this interaction led to staff members phoning her when interesting cases were being considered at the hospital.

So, this vignette illustrates the way that the curriculum – the sequence of experiences that soon progressed, the use of pedagogic practices such as questioning, observation, and also personal engagement – was generative of rich learning. In the next three sections, a brief outline of an elaboration of practice curriculum and pedagogies, and learners' epistemological practices, are provided in building this case.

3.1. Practice or workplace curriculum

The literature on how individuals have learned through their work practices across history and diverse cultures suggests that there are two broad categories of approach. Firstly, there is what might be referred to as an apprenticeship as a way of life: learning through the lived experience of being in a community and engaging in its practices (Bunn, 1999; Jordan, 1989; Rogoff, 1990). That is, learning as part of growing up, all being embedded in a particular set of cultural circumstances. Secondly, there is the deliberate structuring of learning experiences to achieve particular learning outcomes (Bunn, 1999). The former is likely to be the model that has been the dominant one throughout human history up until the modern era, the advent of schooling and preparation for occupations outside the circumstances of their enactment. Even today, apart from the countries which have advanced industrial economies, these are the kinds of models for skill formation that continue to exist. However, currently, within developed countries, the kinds of immersion in occupational practice that featured in earlier times (i.e. by living and work in the masters' house and in a street full of such workplaces) rarely exists as a model for learning the capacities required for effective work very. So, it is the second category of approach – the deliberate ordering of experiences – that is relevant to much of contemporary work. Helpfully, this ordering of experiences is very consonant with the original meaning of the word curriculum (the 'course to follow' or the 'pathway to progress along'). What is evident in the literature is a range of models of workplace curriculum based upon different kinds of pathways.

Ordering of experiences: curriculum pathways of work

Perhaps the most well-known and acknowledged pathway is the sequencing of activities that move from novices engaging in activities in which there are few consequences if errors are made (i.e., low error risk) to those activities in which the consequences of errors are greater (i.e., high error risk) (Lave, 1990). Lave's work identified the progressions of tailors' apprentices based on this principle. Her work also identified the pedagogic qualities and intents in this sequencing that was in many ways analogous to what occurs in educational settings (Billett, 2006). So, in my own work investigating the learning pathways of hairdressers, production workers and room attendants, similar pathways were evident. Equally, a study of junior doctors also indicated progression of activities and learning premised on this principle (Sinclair, 1997). However, not all curriculum pathways are premised upon considerations of error alone. For instance, the stages or pathways associated with learning to be a potter are premised on access to artefacts (i.e., the potter's wheel) and materials (Singleton, 1989). Table 1 below sets out a range of different kinds of sequencing such as those mentioned above, including the approach that Sue experienced in her model comprising parallel practice. This table presents the model of workplace curriculum, a description of its characteristics and the kind of purposes to which it can secure. Although far from comprehensive, the range of models here indicates that there are options for pathways depending upon the kind of work being learned and also the kinds of circumstances in which that working and learning occurs.

An elaboration of all of these models can be found in other publications (e.g., Billett, 2014b), but here they are outlined to indicate the diversity of curriculum models that are a product of exigencies of work and workplaces and, by degree, offer pathways of learning for workers. Yet, beyond a consideration of these curriculum models as pathways, there are other ways by which experiences in workplaces can be augmented to enrich learning. That is, practice pedagogies.

Table 1: Workplace curriculum practices – qualities and ordering of experiences for effective work and learning		
Practice	**Description**	**Purposes**
Apprentice-ship as a way of life	Engaging individuals in the lived experience of workplaces by participating in their everyday activities and interactions (Bunn, 1999; Jordan, 1989) to understand the practices and require-ments for performance (Lave, 1990; Makovichy, 2010).	Identifying goals for workplace performance and learning procedural and conceptual knowledge, including honing procedures, forming propo-sitional associations and developing strategic procedures.
Ordering of experiences	Providing access to and ordering of experiences required to learn occupational capacities not acquired through everyday work. Might entail skill acquisition in stepwise manner, from those skills that are easy to learn to those which are more difficult.	Offering a pathway of experiences through which occupational capacities (i.e., conceptual, proce-dural and disposition of) can be developed.
Learning curriculum	Organising access to work activities from those that have low consequences when errors occur, to those where the costs of errors are high. Commencing with observations to understand goal states and then progressing through in-creasingly demanding work requirements (Lave 1990). In work where all components carry the same salience (e.g., midwifery (Jordan, 1989), junior doctors (Sinclair, 1997), learning might be acquired in a linear order.	Organising a pathway of experiences whose or-dering is based on pedagogic and practice-based considerations, such as increased complexity, error cost.
Learning activities as work condi-tions permit	Learning staged around workplace imperatives (e.g., learning pottery premised on access to potter's wheel: i) pre-practice observation with apprentice engaged in menial work activities; ii) tentative experiments with wheel, (when not used for productive purposes); iii) assigned regular practice at wheel; iv) assigned produc-tion tasks at wheel; and v) a period of work to repay training (Singleton, 1989)).	A pathway of experiences based upon access to other workers, equipment, resources that brings together the imperatives of work, workplace and learning.
Parallel practice	Individuals engaging in an occupational practice, and being monitored and checked by a more experienced partner at key point in task completion (Billett & Sweet 2015), (e.g., doctors – seeing patients, taking histories and conducting examinations, often in parallel with what has been done by a registrar, (Sinclair 1997)).	Opportunities to engage in authentic activities whilst being monitored and checked by a quali-fied practitioner.

3.2. Practice pedagogies

As proposed earlier in this chapter, much of the learning required from work arises through individuals' everyday engagement in it and their work practices. These every day engagements in goal-directed activities are what permits the process of ongoing development and exposes workers to new challenges from which novel learning arises. Nevertheless, the quality of that learning can be supported and assisted by interactions with others, and the clues and cues provided by artefacts and other sources of information. These are referred to as being pedagogic practices, and so far as they are embedded within the conduct of occupational practice, they are referred to as practice pedagogies. The term 'pedagogies' is used to more broadly capture the contributions that assist and augment learning that go beyond those provided directly by more informed others (teachers, experienced workers, supervisors etc.) through instruction, story-telling and collaborative working. They extend to artefacts, such tools, completed or half completed jobs and also what can be secured through observing, hearing and other forms of sensory engagement. These kinds of pedagogies are important for augmenting learning through work, and in particular, going beyond the circumstances that might otherwise be limited by individual discovery alone. Moreover, it was also identified that there are limitations to learning through everyday work activities because not all knowledge is easy to access, or to comprehend when accessed. Certainly, a consideration for contemporary work is that much of the knowledge required for effective work practice is conceptual and symbolic (Barley, 1996) and, therefore, requires being accessed and learned in ways which make it more explicit and accessible (Harteis, 2017). With the increase in the use of electronic technologies, for instance, the kinds of knowledge that used to be learned through sensory processes and engagements is becoming a lesser requirement as work task become less dependent on manual manipulation. Instead, less accessible forms of conceptual knowledge are now becoming important to learn, and need to be engaged with through the use of symbols and other forms of representation that can assist individuals' engagement and building representations of that knowledge. Hence, there is a requirement for pedagogies that can enrich experiences and support that learning. The word 'pedagogic' is used here to encompass a range of contributions that can mediate individuals' thinking and acting in support of that learning. Often, there is a need to go beyond teaching or direct instruction. Instead, there is a need to identify practices which make knowledge accessible and engaging, particularly when related to the kinds of activities which can be learned and applied. The anthropological literature offers a range of pedagogic practices. For instance, the use of available artefacts (Pelissier, 1991) and the role of story-telling (Jordan, 1989) as a means by which a narrative provides a context, and a way in which individuals can engage, remember and recall what they have learned, are important contributions to individuals' mimetic learning. The process of verbalisation (Gowlland, 2012) has a similar quality, in so far as it makes the thinking of experts accessible to novices who are able to engage with what is being stated, then appraise it and relate it to their knowledge and ways of knowing.

Then, there are particular work activities that are pedagogically rich (Billett, 2010). That is, they have inherent qualities that make them potentially potent as learning experiences. For instance, the handovers held by nurses and other health care workers are representative of these experiences. The ability to discuss, compare and evaluate patients, their condition(s), treatment(s), and progress and then permit prognoses to be constructed represent rich learning experiences because of the contextual nature of the activities, individuals' engagement in them and the responsibility drawn from them. The opportunity to discuss, evaluate and consider options interpersonally potentially enriches these learning situations. In addition, there is the close guidance that can be provided by more experienced workers when what needs to be learned is unlikely to be done so through individuals' discovery alone (Billett, 2001; Gowlland, 2012; Rogoff, 1995). Consequently, in those circumstances, engaging with more experienced co-workers and gaining more knowledge and making that knowledge accessible can be crucial for learning that 'hard to learn' knowledge. Moreover, beyond direct guidance is that which occurs indirectly through observing, listening to and otherwise indirectly engaging with more experienced co-workers, and their actions and outcomes (Gowlland, 2012). Then, there are specific procedures such as heuristics or tricks of the trade (Billett & Rose, 1997) which are helpful procedurally for securing outcomes. In terms of conceptual development, mnemonics are helpful for providing reminders, cues and devices to recall demanding and interrelated knowledge (Sinclair, 1997). Physical contributions can also come from the layout and qualities of the setting (Barker, 1978; Lave, Murtaugh, & de la Roche, 1984) and from being able to access cues and clues, such as partially worked or completed examples of the tasks that need to be accomplished (Makovichy, 2010).

In Table 2 below, some of these kinds of pedagogic practices are set out. They are listed in the left hand column, described in the middle column and their potential purposes are provided in the right hand column. Again, what is evident is that these particular pedagogic practices are of different kinds, have particular qualities and can be directed towards different kinds of purposes. These pedagogic practices are elaborated in other publications (e.g., Billett, 2014c).

Table 2: Workplace pedagogic practices – activities and interactions that permit performance and enrich learning		
Practice	**Description**	**Purposes**
Storytelling	Telling stories about work events and incidents (Jordan, 1989).	Illustrating or capturing concepts or hypothetical formulations to assist in decision-making; legitimate practitioner as expert.
Verbalisation	Talking aloud whilst performing a work task as a form of direct guidance can be linked to 'hands on' engagement (Gowlland, 2012).	Explaining thinking and acting being used whilst performing work tasks.
Pedagogically rich activities	Workplace activities that are inherently pedagogically rich, e.g., handovers (Billett, 2010) or case discussion, moderation or planning meetings.	Developing conceptual and specific and strategic procedural capacities.
Guided learning (proximal guidance)	Direct interaction between more and less experienced co-workers, to promote learning in work settings. Use of modelling, demonstrating, guided practise, monitoring progress and gradual withdrawal of direct guidance (Billett, 2000; Collins, Brown, & Newman, 1989; Rogoff, 1995), master placing hands on novices' to assist getting the 'feel' of pottery (Gowlland, 2012); guided discovery – placing novices in situations where they can practice, hone skills, and gain experience independently, yet still can have direct guidance (Ingold, 2000).	Extending what individuals can learn through discovery alone, by modelling of activities to be learned, guidance to assist achieve modelled performance and providing opportunities to refine and hone.
Partially worked example/direct instruction and hands on	Combination of guidance and using a worked example, e.g., experienced lace-maker producing a small piece of simple lace, showing novice how bobbins are held, and placing hands on those of a novice to assist learning hand movements to use the bobbins; also asking novice which bobbin they should use for the next stitch before novice makes movement, leading to confidence in action; questioning gradually ceased as competence demonstrated (Makovichy, 2010).	Provision of models for performance, ability to engage in sub-skills associated with that performance and build understanding about procedural capacities.
Heuristics	Tricks of the trade (i.e., procedures that will give you certainty) (Billett & Rose, 1997).	These develop procedural capacities through providing devices that assist in securing workplace goals.
Mnemonics	Developing and using mnemonics (doctors' use of 5 Fs, DANISH to remember about cerebellar lesions) and actual patients ("remember Mr Leeming and you will remember about duodenal ulcers", Freddie Mercury and missed seroconversion) (Sinclair, 1997) for procedural efficiency (Rice, 2008, 2010).	A means to remember and recall propositions and secure procedural efficacy.
Artefacts	Artefact or notation system, assists by embedding the knowledge required in a localised context and assists skill and proficiency (Makovichy, 2010).	Providing clues and cues on how to proceed.

It will be noted that these pedagogic practices are quite different than those used in classrooms. This is an important distinction. That is, many teaching strategies and classroom pedagogies are founded on the exigencies of the physical environments of classroom and their norms and practices. They are premised on and designed for instruction and for large numbers of individuals positioned and students, probably modelled on church pulpits. Conversely, practice pedagogies are associated with the social and physical circumstances of workplaces and the practices within them, and, importantly, they are embedded within the practices that need to be learned. Part of this often means that they have to be enacted as part of everyday work activities, not separated or distinct from them.

In sum, these considerations of curriculum and pedagogic practices can be seen as being what has been afforded to workers through their workplaces and work activities. Yet, as noted above, learning through social practices is premised on the duality between what individuals have been afforded and how they elect to engage with what has been afforded to them. This suggests that the contributions, invitations and affordances are nothing other than potential contributions to individuals' learning and development. Ultimately, it is how individuals engage with that learning. Central here are individuals' personal epistemologies which shape how they engage with what has been afforded to them.

4. Personal epistemological practice

As has been stated throughout this chapter, it is insufficient to explain the contributions to and processes of learning through work by only referring to what is afforded by the physical and social setting in which workers engage (i.e., workplaces). Instead, understanding and accounting for this process of learning needs to go beyond what has been afforded and consider how individuals come to engage with the ways in which they are invited to participate in, and learn through, work activities and interactions. As noted earlier, throughout human history the vast majority of learning and development is likely to have arisen through individuals' personally-mediated learning. That is, how they use what they know, can do and value to construe and construct what they are experiencing. It is through mediating what they experiences in this way that they construct outcomes (i.e. learn). Through these personally-mediated actions learning and development arises in everyday life, and that is no different in the workplace. So, when considering individuals' learning through work, it is important to acknowledge that it is shaped by individuals' personal epistemologies (i.e., their bases for knowing, engaging and learning). In terms of the knowledge required for work activities, that mediation is based upon what they know, can do and value, which is reciprocally developed further through these interactions. To be reminded, individuals' knowing and doing is shaped through what they know (i.e., propositional knowledge), can do (i.e., procedural knowledge) and value (i.e., dispositional knowledge). It is these forms of knowledge that together are enacted and further developed as individuals engage in everyday activities, such as those at work.

The literature identifies a range of ways in which this personal mediation of experience and the legacies from it (i.e., learning and development) arise. These include what is referred to as imitation, which is held to be an important process for most kinds of animals, but in particular for humans, who have taken this process to a high level (Gardner, 2004; Jordan, 1989; Marchand, 2008; Tomasello, 2004). This process is consonant with the process of *mimesis* (i.e., observation, imitation and action) and with what has been referred to above as mimetic learning, which goes beyond a reliance on observation and proposes that all of the sensory inputs play a role in human sense-making and learning. There are a range of strategies associated with the deployment of mimesis and one of these is referred to as ontogenetic ritualisation (Tomasello, 2004). This concept refers to how two interlocutors engage with, and secure access to, what one needs from the other. Based on observations of orangutans, where babies negotiated with their mothers to gain access to the breast, this process has parallels in the way that humans negotiate with each other to gain access to partnerships, to shared activities and also to each other's knowledge.

However, given the personally mediated nature of this form of learning and development, the importance of learner readiness (Bunn, 1999; Singleton, 1989) has come to the fore. Readiness here refers to the level of capacities individuals have to engage in activities and learn from them. For instance, if individuals have no knowledge of a particular language or its grammatical structure, merely being immersed in a situation where that language is being used may not be a productive learning experience, because they are not ready to engage effectively. Furthermore, individuals need to assent to that engagement (Mishler, 2004). Only they will decide on the ways in which they will come to engage in the effortful process of constructing meaning, developing procedural capacities and developing further though values and interests. Aligned here is the process referred to as deliberate practice (Ericsson, 2006; Gardner, 2004; Sinclair, 1997). This is the effortful, intentional, and focused engagement by individuals to learn, hone and further develop their capacities. Such activities are most likely to occur when individuals sense that this learning is important and see it as part of sustaining their sense of self. In Table 3 below are set out a range of these personal epistemological practices, with a description provided and those purposes associated with learning in and through work.

Table 3: Personal epistemological practices – premised on individuals' capacities, agency, intentionality and sense of self		
Practice	**Description**	**Purposes**
Mimetic learning	Ability to imitate and interest to do so at work (Billett, 2014). A fundamental process of human learning (Jordan, 1989), by imitating implicitly or explicitly how experienced workers practice (Marchand, 2008) including asking questions or listening to them (Gardner, 2004), is a higher order activity.	Process through which goals, procedures (both specific and strategic), propositional links and associations can be learned through personal engagement.
Ontogenetic ritualisation	A system of communication and engagement between social partners negotiated through repeated social interactions (Tomasello, 2004), supports close guidance and reciprocal interactions in workplaces permitting co-workers to engage in learning reciprocally.	Basis through which to engage with others from whom guidance is derived.
Embodied knowledge	Ability to do rather than talk about it, arising through practice (Jordan, 1989), renders unconscious much of what is required for performance (claims over 90% rendered non-declarative) (Lakoff & Johnson, 1999; Reber, 1992).	Procedural learning derived through practice and rehearsal that becomes able to be applied without conscious recall.
Deliberate practice	Practising skills and monitoring their improvement (Gardner, 2004), as the means by which agency, focussed intentionality and the act of rehearsal come together to secure effective performance (Anderson, 1982).	Process of rehearsing, honing skills, refining, monitoring personal performance and making conscious efforts to improve performance.
Guided re-discovery	Novices engaging in situations where they can practise, hone skills, and gain experience by themselves, yet can still access direct guidance (Makovichy, 2010; Ingold, 2000).	Process of remaking knowledge through opportunities for observation, listening and other forms of social engagement and practice.
Active engagement & construction	Importance of active engagement (i.e., observation, listening and mimesis). Apprenticeship means apprenhendere (i.e., to seize, lay hold of, apprehend, and apprise with the mind -- to inform, give form: to shape) (Webb, 1999).	Through participating in goal directed activities, learning arises through seeking out, actively constructing and appropriating the knowledge able to be accessed.
Observation	Japanese word for apprentice is minarai – one who learns by observation – also unobtrusive observation minarai kyooiku - serious learning progresses without didactic instruction (Singleton, 1989).	Provides access to goals, models for procedures and bases for developing procedural capacities.
Averting gaze	Mediating the external (i.e., immediately social) contributions – actively ignoring erroneous suggestions to secure an immediate goal to effect productive activities (Glenberg, Schroeder, & Robertson, 1998)	Intentional engagement with what needs to be learned.
Readiness	The level and qualities of what individuals want to? know and can do.	Mediate the capacities for learning as a result of earlier experiences (and learning).
Assent	Individuals' willingness to assent to effortful learning (Mishler, 2004).	Mediates how individuals engage with external suggestions, supports.

5. Securing occupational capacities through practice

It has been proposed in this chapter that the growing interest in promoting learning through work, both for the initial development of occupational capacities and for sustaining and developing them further across working life, needs to be supported by understanding the particular ways in which the learning of occupational knowledge arises through these settings. Consequently, it is also important to identify and articulate the premises that assist in understanding and generating sets of concepts that can explain this phenomenon. In particular, these premises and concepts are essential in understanding and appraising these workplaces as environments in schooled societies in which there is a privileging of learning processes and outcomes, arising through experiences in educational settings. The conceptual and explanatory elaborations advanced here offer bases to consider how the securing of occupational capacities can progress in contemporary times. Moreover, to achieve the kind of outcomes which are now being sought by government, workplaces, workers and educational institutions, it is necessary to advance ways in which these can be realised. Proposed here within the broad framework of a duality between workplace affordances and individual engagement, are the key tenants of practice curriculum and pedagogies, and personal epistemologies. Listed above are a range of proposed models of practice curriculum that are in different ways applicable to particular kinds of workplaces and occupations. Moreover, the listing of pedagogic practices has particular processes and purposes that they are likely to promote. Then, and at least as important, is the learners' personal epistemologies with their attendant processes and qualities. It is proposed that together these three elements are those that help explain, not only how learning through work can progress, but ways in which learning through work can be promoted to achieve the kinds of outcomes required for contemporary workplaces. Hopefully, these suggestions might assist with this important task.

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Martin Mulder

▶ The Global Need for Competence: Competence-based VET and Implications for Policy and Practice[1]

1. Introduction

There is a global need for competence. This can be developed in various ways, and vocational education and training (VET) is an important modality to deliver competence at the basic, intermediate and higher levels of the labour market. VET comes in different forms and worldwide its quality differs enormously. Various attempts are being made to innovate systems and programmes of VET to add value to its graduates, the labour market, socio-economic development and inclusion (Mulder, 2012c). One of these attempts is based on competence theory, and is known as competence-based VET (CBVET). CBVET is a worldwide innovation in Western and non-Western education systems. This innovation apparently has many advantages, but proper implementation also has profound implications for VET policy and practice.

The competence movement nowadays is related to the great challenges on planet Earth. There is more need for competence than ever. Examples of global issues are climate change, food security, water management, air pollution, geopolitics, migration, and energy. Professional competence at all levels is needed urgently to address the many challenges.

CBVET at all levels, including Higher Education (Mulder et al., 2009) and in all specialisations plays an essential role in developing professional competence around the globe.

This paper will address CBVET as a common framework for initial and continuing vocational education and training (ICVT), which is not confined to Western high-GDP countries, but which has also been adopted in many developing and emerging societies, including the global South (Mulder & Gulikers, 2011; Mulder & Kwagalakwe Kintu, 2013).

As in the wide diversity of ICVT practices at global level, there is variety in CBVET approaches. It is as if several waves of competence-based education (CBE) have been rolling over one another. The origins of these waves will be explained, so as to better understand the current trends in CBE.

As a preview, CBE was started in the early 1900s in the USA to improve the quality of teacher education. This was based on earlier remarks about the competence of teachers in the 19th century. The first attempts to introduce CBTE in the 1960s and 1970s in the USA

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1   Parts of this paper are based on earlier publications (notably Mulder, 2014; Mulder, 2016; Mulder, 2017a; 2017c; 2017d).

were not particularly successful. Due to the influence of humanistic psychology (Rogers, 1969) CBE faded away. But soon after that, competence-based practices proliferated in educational testing, management training and development, human resource management, corporate strategy, sectoral qualification policy, and VET at all levels. There are a number of competence trails in VET which follow the past and present work programmes of the various national and international aid and education organisations in the field of development cooperation. Some date back to the practices proposed in the 1960s and 1970s, and are strongly behaviouristic. Others are based on newer conceptions of CBE, and take the results of recent educational research into account. In this paper, these background developments will be elaborated.

Despite the history of and current attention being paid to CBE, many mistakes have been made with the design, development and implementation of competence-based education (CBE), and it seems that these mistakes are being repeated over and over again. Many researchers have pointed this out. Extreme critics have stated (and still contend) that CBE is a detrimental educational philosophy, if any (Mulder et al., 2007; Mulder, 2017c).

Many governing and educational institutions have indeed given cause for scepticism, as many CBVET approaches are based on outdated versions of CBE theory and obsolete competence frameworks, whereas full attention has to be paid to key competencies which professionals need to address the great challenges of the future.

This paper will analyse what has gone wrong, and what lessons have been learned for governing current CBVET, organising and managing CBVET, working conditions and career management of CBVET teaching staff, CBVET curriculum and learning, CBVET teacher education and professional development, and CBVET quality assurance.

First of all the competence construct, its origins and definition will be presented. Next, the proliferation of competence practices will be described. Then, CBE will be characterised as a worldwide innovation. In the following section essential systems features of CBE will be distinguished. To create some overview in the variety of theoretical views and operational approaches, three theoretical approaches of competence will be indicated. Next, proposals on competence for the unknown future will be reviewed, and a tentative synthesis will be presented of these proposals. Based on the previous section, lessons for policy and practice will be stated, and finally, conclusions of this paper will be drawn.

As a final introductory remark: the background of this paper is a series of projects within a programme on competence development which lasted over 15 years. Various PhD dissertations were written and papers were published based on these projects. They were all aimed at studying specific competence issues, such as on competence development in organisations (Mulder, 2002), but also argumentation competence (see Noroozi et al., 2011a; 2011b; 2012a; 2012b; 2012c; 2013a; 2013b; 2013c; 2015; 2016), entrepreneurial education and learning (Lans et al., 2008a; 2008b; 2010; 2011; 2014; Karimi et al., 2010; 2014; 2016a; 2016b; 2017; Baggen et al., 2015; 2018), innovation competence (Du Chatenier et al., 2009; 2010), intercultural competence development (Popov et al., 2012; 2014a; 2014b),

oral presentation competence (Van Ginkel et al., 2017; 2015), social responsibility competence (Osagie et al., 2016; 201), interdisciplinarity competence development (Spelt et al., 2009; 2010; 2015; 2016;), competence assessment (Gulikers et al., 2009; 2013), hybridisation of VET (Cremers et al., 2014; 2016; 2017), training for practical competence (Khaled et al., 2014a; 2014b; 2015; 2016), regional learning (Oonk et al., 2016), teaching competence (Kasule et al., 2014; 2015; Alake-Tuenter et al., 2012; 2013; Misbah et al., 2015) and teacher teamwork and learning (Bouwmans et al., 2017; Zoethout et al., 2017).

2. The competence construct – origins and definition

The question, "Is the competence construct a new construct, or is it old wine in new barrels?", has been asked many times. The code of Hammurabi gives one of the answers. Hammurabi was the sixth king of the First Babylonian Dynasty, and he is known for making the oldest Code of Law, which was carved in stone. In various translations this law is called the law of the *competent* King Hammurabi. So no, the construct is not new, but its institutionalisation is.

The Code of Hammurabi shows that there are at least two dimensions in the meaning of competence as a concept. Usually we think of competence as mastery of a skill, but it also related to power and authority. Actually, competence can be seen as a binary construct, a combination of the *capability* to perform in terms of proficiency, mastery, ability, and the *right* to perform, in terms of legal authority, licensure, certification, institutional, organisational, cultural or regulated power, approval or assignment to act, decide, (dis)approve or regulate.

Actually, in VET both dimensions are being used all the time. Schools teach students to become capable professionals, and present diplomas to certify this capability, and hence the licence to perform certain duties. This is easily visible in certified professions such as medicine, teaching, registered accountancy, and nursing, but also in car driving, airplane flying, and chemicals handling.

Given these two meanings of competence, what is competence? There is a lot of debate on that. The practical understanding of competence can be explained by what professionals like flower traders need in terms of knowledge, skills and attitudes. As to knowledge, for instance, they need understanding of product quality and the flower market; as to skills, they need to be able to handle multi-tasking, and to interpret and combine different pieces of information; and regarding professional attitudes, they need tolerance for stress, a good feeling for sales, and to be open to change. Competence needs like these can be specified for all professions, and some of these competencies are general, but many are also unique to specific professions. The combination of professional knowledge, skills and attitudes is what is generally called professional competence in practice.

The process of analysing, identifying, defining and mapping professional competence is, however, quite complex. At least two different approaches can be followed.

The first approach is to try to find the most *general* competencies which explain job performance and predict job success. This is quite important in personnel selection and assess-

ment. The most elaborate example of this approach is the study by David Bartram, who developed a competency framework which consists of the 8 most generic competencies, hence the Great Eight Competency Framework (Bartram, 2005). Examples of these competencies are Leading and Deciding and Supporting and Co-operating. The eight competencies included in this framework are precisely defined, and consist of more detailed competencies. But they are all behavioural in nature. The list reads like a series of characteristics of people, and resembles the Big Five of Barrick and Mount. Bartram's model was used in Dutch vocational education to implement competence-based education, but was not a big success.

A very different approach is to describe professional competence from a *content* perspective. Responsibilities, tasks and activities are important elements in this approach to analysing, defining and mapping competencies. An elaborate example of this approach is that of the Canadian Medical Association (CanMeds), which has developed a Competency Framework for medical doctors (Frank & Jabbour, 2005). In this framework, many statements can be found of what medical doctors should be able to do in professional practice. The framework also comprises generic competencies such as communication, but goes much deeper into the content of the job of medical specialist. The example of the flower auction is more in line with this CanMeds Competency Framework. Competency frameworks are much more profession-specific.

As a caveat it can be said that the original attempts to implement CBE were doomed to fail because of their over-specification. There is a limit to the level of content-related specification of competence, but there should not be over-generalisation, either. Finding the right balance between those two is an intricate dilemma.

3. Proliferation of competence practices

How did competence as a construct emerge in the educational literature? First of all, there is the report by True (1929) on the history of agricultural education in the United States. The word competence is used in that work several times, such as in the phrase "competent teachers". But the famous American educational philosopher, John Dewey, also used the concept competence in his work, around his democratic ideal, in the sense that everybody should be given the opportunity to develop competence, and to choose and pursue a career (Dewey, 1916).

The first publications on competence as a special construct were in teacher education. There have been several publications addressing the question as to how to improve the quality of teacher education by focusing in teacher and instructor competence. See the publications of Domas and Tiedeman (1950), Barr (1950), and Morsh and Wilder (1954). The latter is a review study which spans the first half of the 20th century.

It was White (1959) who published the first article in the field of psychology in which he used competence as an academic construct to explain behaviour. He thought of competence as an alternative for the motivation psychology of Freud (who stressed the importance of

unconscious drivers of behaviour). According to White, children and adults are motivated to become competent in what they do. Look at babies, who want to learn to crawl, stand upright and walk, and speak. White saw competence as the ability to interact effectively with the environment. This view on competence later evolved into the performance-motivation theory.

The concept of competence quickly became popular in other disciplines, such as in linguistic theory. Noam Chomsky in his Theory of Syntax (Chomsky, 1965) sees competence is a the underlying linguistic ability to create and understand sentences, including sentences never heard before. He sees linguistic output as performance. It is interesting to note his view that knowing linguistic rules does not automatically guarantee being able to speak correctly. So knowing, competence and performance are very different things. This is also one of the lessons I take from the competence debate: Knowledge alone is not enough. Yet, many curricula of educational programmes are overloaded with knowledge. It is the ability to use that knowledge in actual performance which adds value to individuals; hence, education should include the opportunity to practice competence in authentic learning situations.

David McClelland (1973) pointed at the importance of competence-based testing. Much testing until the early 1970s was based on intelligence, but he showed that intelligence testing did not have much predictive validity for job success. Therefor he recommended testing what people actually can do. He also stressed the importance of identifying competencies based on what superior performers do.

There are many other scholars who have contributed to the proliferation of the competence construct. There are too many to mention actually, but various authors have been very influential in the fields of performance studies (Gilbert, 1978), management studies (Boyatzis, 1982; Quinn et al (1996), organisational studies (Prahalad and Hamel, 1990), and professional development studies (Eraut, 1994).

All developments in theory, research and practice have emerged in the *current* state of competence practice:

▶ Many professional associations have developed competence frameworks;

▶ Various governmental organisations also developed and enacted competence frameworks, such as for teachers;

▶ Testing companies have developed various competence measurement tools;

▶ Consultancy firms have developed competence dictionaries and provide advisory services for assessment and development;

▶ Many companies have their own competence management systems;

▶ And many educational institutions have implemented qualifications frameworks in which competencies are integrated.

So we can safely say that competence-based practices are widely proliferated in different professional fields, and institutionalised indeed.

4. CBE as worldwide innovation

As stated in the Introduction, competence-based practice is distributed across the globe. A short browse on the internet shows many examples. Recent examples are, for instance (all webpages accessed on April 24, 2018):

- ▶ Improving technical and vocational education in China
  http://www.worldbank.org/en/results/2015/09/14/china-improving-technical-and-vocational-education-to-meet-the-demand-for-high-skilled-workers

- ▶ A German Chambers of Commerce project in India
  https://www.youtube.com/watch?v=w9MmrAYYLxE

- ▶ An ILO-project in Bangladesh
  http://www.ilo.org/dhaka/Whatwedo/Projects/WCMS_226472/lang--en/index.htm

- ▶ Developing competence-based TVET in Nigeria
  http://files.eric.ed.gov/fulltext/EJ1081283.pdf

- ▶ Developing competence-based TVET in Rwanda
  https://www.unicef.org/rwanda/events_16490.html

- ▶ A competence-based curriculum in Mexico
  https://www.competencyworks.org/k-12-higher-education/going-international-a-report-from-mexico-on-competency-education/

Given the enormous variety of competence theories and practices, in 2013 it was decided to compile an edited volume which comprises that diversity. The volume was published in 2017 (Mulder, 2017a), contains chapters from five continents, and includes (apart from countries in Europe), countries like Australia, Canada, China (Fan, 2017), Rwanda (Van Halsema, 2017), the USA and Vietnam (Viet, 2017). The book starts with a number of lead questions, which are answered in the last chapter. There are four parts in the book, on different theories, policy developments, CBE systems features, and emerging competence domains.

A question often asked is how competence-based education compares to another worldwide educational theory, which is the theory of strategic alignment put forward by Biggs (1996). That theory is the foundation of the outcomes-based education approach. It stresses the importance of defining learning outcomes, and of aligning learning arrangements and assessment strategies with these. In Chapter 11 of the book it is explained that competence alignment theory relates to Biggs' theory very well, in that it is a kind of extension of that theory. It includes competence frameworks and the educational philosophy of an education-

al institution as important inputs for the strategic alignment of outcomes, learning and assessment.

5. Systems features of CBE

Now that a short review of the genesis of the competence construct in education has been given, and CBE has been shown to be a worldwide innovation, the systems features of CBVET will be listed. Mature systems of CBE should at least include the following:

▶ There should be validated competence frameworks, in which employers should have a strong say (Mulder, 2017b).

▶ There should be a tool to assess the current and desired level of implementation of principles of CBE. For this, VET institutions can use the Matrix of CBVET, consisting of principles of CBE and levels of implementation. With this instrument, programme teams or complete institutions for VET can determine themselves where they are regarding the innovation of CBE, and where they want to go to (Wesselink et al., 2007; 2010; 2017; Sturing et al., 2011).

▶ There should be a system for the assessment and acknowledgement of prior learning, and, as a consequence of that, a system for adaptive learning; students should be able to accelerate or slow down wherever and whenever they can. This is a great challenge for schools! But there are already examples out there to follow, of schools which rely more on coaching individual learning processes than on frontal classical instruction (Bohlinger, 2017).

▶ There should be a system of formative competence assessment, in which assessment is seen as a tool for learning (Van der Vleuten, Sluijsmans & Joosten-ten Brinke, 2017).

▶ There should be a trustworthy system of authentic summative competence assessment, to see whether the student has acquired all qualifications to start a career as a professional in the field of study.

▶ There should be a system for laddering competence levels, which differentiates competencies for different educational levels (De Jong, Corten & De Jong, 2017).

▶ Finally, educational institutions should have a system for competence-based human resource management, for management and staff assessment and development purposes (Mulder, 2002).

Many educational institutions which state that they are offering competence-based VET programmes do not have these systems features in place.

6. Three theoretical approaches of competence

To establish a further overview of the field of competence theory, some years ago, different dimensions in definitions of competence and different competence theories were distinguished. These may be helpful, given the wide variety of competence theories.

Dimensions by which competence definitions vary are centrality, contextuality, definability, developability, dynamic nature, knowledge-inclusion, measurability, mastery level, performativity and transferability.

Based on the review of definitions of the concept of competence, a working definition of 'competencies' was proposed (Mulder, 2002), which has been slightly modified over the years. Competencies are: integrated capabilities, consisting of clusters of knowledge, skills, and attitudes, which are conditional for sustainable effective performance, including problem solving, realising innovation and creating transformation, in a certain profession, occupation, job, role, organisation, or situation.

In a later stage, three groups of competence theories were mentioned, which have been elaborated elsewhere (Mulder, 2014). These will briefly be mentioned here.

The first group is Functional Behaviourism, which focuses on detailed tasks and leads to training of sometimes miniscule skills. Competence-based training of this kind was originally used a lot in the military, but later applications were used in teacher training. The pitfall of this approach is over-specification and lack of cohesion of what is being learned.

The second group is Integrated Occupationalism, in which knowledge, skills and attitudes are combined and linked to core tasks and work processes. This approach is widely used in vocational and professional education, although the way in which this is done differs considerably. The pitfall of this approach is that it is too strongly related to performatism, and that learning out of curiosity may be neglected too much.

The third group is Situated Professionalism, which is particularly pertinent for the professional development context. This group of theories emphasises the contextual specificity of competence (see Mulder, 2015). The pitfall of this approach is the over-generalisation of the use of competencies. This happens most in human resource management in which only a few competencies are assessed and personal development plans are drawn up for only one or two competencies.

In different context (training, education and development), different competence theories may apply, or even a combination of approaches may be most helpful. Given these three theoretical approaches, the word 'integrated' may be deleted from the definition of 'competencies', thus including behavioural, occupational and contextual understandings of competence. This has two advantages: the integrated nature is already mentioned by the notion of 'clusters of knowledge, skills and attitudes', and the contextual, which is not separately mentioned in the definition, is then also included. Competencies are then seen as behaviourally, occupationally and situationally defined capabilities, and the rest of the definition can remain unchanged.

7. Competence for the unknown future

On top of the definition of competence and competence theories, three kinds of competencies are distinguished, which are competencies for 1. specific tasks, 2. known jobs, and 3. for the unknown future. In VET as well is in education and training in general, much attention has been given to competencies for known tasks and present jobs. Instead, more attention needs to be paid to future-oriented competencies, which relates to the debate on key skills and competencies, and 21st century skills. There have been various attempts already to define competence for the future. Amongst these are the DeSeCo Model of Key Competencies (Rychen & Salganik, 2003), key competences for lifelong learning (European Union, 2006), 21st Century Skills (NCREL/Metiri Group, 2003), the Essential Learning Outcomes (AAUC, 2008), Seven Survival Skills for today's students (Wagner, 2010), P21 – 21st Century Skills Framework (2015), and Critical Competencies For Future Leadership (Vora, 2015). Space does not allow further elaboration of these, but again, there are many different initiatives which call for synthesis.

A first attempt has been made to compare these initiatives, and to create a coherent model for future-oriented competence. Based on a tentative list of future-oriented competencies (Mulder, 2017c), future-oriented competencies were further mapped. This was done by a content analysis of the various sources on future-oriented competencies mentioned, which were divided into five groups of competencies, as depicted in Figure 1.

This model of competence for future life consists of two dimensions and a core. The core of the model is integrative learning competence, which is essential for understanding all other fields in the model. The horizontal dimension is the dimension of professionalism, and consists of the personal and social competence side of that. The vertical dimension consists of the disciplinary/interdisciplinary knowledge base and the personal ability to manage oneself and one's career. The knowledge base is the foundation of professionalism and should not be neglected. The various competence domains were first published recently (Mulder, 2016; downloadable from www.mmulder.nl).

Figure 1: Model of competence for future life (from Mulder, 2016)

To summarise the competencies in the model, the integrative learning competence consists of

ambiguity and uncertainty handling, dealing with vulnerability and ambiguity, developmental competence, knowledge co-creation competence, leadership competence, evaluation competence, synthesizing competence, sustainability competence, and transformation competence (op. cit, 26).

The other four competence domains are specified as follows:

The foundational disciplinary and interdisciplinary competence includes financial, economic, business literacy, mathematics literacy, social sciences literacy, humanities literacy, languages literacy, arts literacy, digital (ICT) literacies, media and information literacy, reading, writing, numeracy, computational competence, science, technology, design and inquiry literacies, environmental literacy, higher order thinking, sound reasoning, inquiry and analysis and interdisciplinary problem solving competence.

The self-management and career competence includes acting autonomously, self-regulation competence, life planning competence, personal project planning competence, responsibility, managing for results, prioritizing, productivity, accountability, argumentative reasoning, resilience and stamina, sense of initiative, innovation and entrepreneurialism, calculated risk taking, and lifelong learning competence.

> The personal-professional competence includes adaptability, flexibility, agility, reflection and self-awareness, emotions handling, curiosity, imagination, and creativity, intuition, mindfulness and integrity, big picture visioning, global competence, cultural awareness and expression, civic competence (balancing, defending/asserting rights, interest, limits, needs), anticipate and create change, critical thinking and complex problem solving, managing complexity, health competence, physical competence, and ethical reasoning and action competence.

> Finally, social-professional competence includes civic knowledge and engagement, relating well to others, interpersonal competence, interactive communication skills, clarification competence, meaning negotiating competence, multicultural literacy, productive teamwork, collaboration in networks, creating ecosystems for engagement, and managing and resolving conflicts (op. cit, 27).

As mentioned earlier, an ongoing discussion about this model is needed, as future-oriented competencies are dynamic by nature.

8. Lessons for policy and practice

Having now described the origins of the competence construct, shown the proliferation of competence theory and practice, mentioned the notion of competence-based practice as a worldwide innovation, given examples of VET development cooperation, distinguished three theoretical approaches of competence and three kinds of competencies, and proposed a model for future-oriented competence, lessons learned for CBVET policy and practice will be presented.

Earlier a large programme on the development and implementation on CBVET was conducted, based on which two articles were published (Biemans et al., 2004; 2009), which are full of pitfalls and ways in which these can be handled. The main takeaway lesson of these articles is that CBVET is a complex innovation, and that all expertise which is available should be combined to make it a success.

Below, the lessons are formulated.

Governance of current CBVET
These lessons are mainly based on experiences in competence research in the Netherlands Europe and the Global South (Nederstigt et al., 2011).

▶ Provide good examples of CBVET practice;

▶ Provide sufficient facilities for the development and implementation of CBVET;

▶ Support research on the efficacy of CBVET;

▶ Review experience of employers with CBVET graduates.

▶ Beware of the cultural context of implementing CBVET

For the organisation and management of CBVET
These lessons are mainly based on experiences in a study on competence management in large companies in Western Europe.

▶ Develop competence framework for all co-workers at all levels.

▶ Integrate competence management in annual performance reviews.

▶ Make managers accountable for implementing competence management.

▶ Give a good example by committing to competence self-assessment and development.

Working conditions and career management of CBVET teaching staff
These lessons are mainly based on experiences of CBE implementation in Africa and Asia and competence research in the Netherlands.

▶ Provide career perspective with role descriptions based on competence framework for lectures and managers in CBVET;

▶ Provide teaching and learning environment and resources which enable the implementation of CBVET;

▶ Stimulate competence-based assessments and feedback for professional development in CBVET;

▶ Stimulate innovation, collaboration and team learning in CBVET.

Curriculum and learning in CBVET
These lessons are mainly based on advanced research in the Netherlands and Africa.

▶ Determine present and desired level of implementation of principles of CBVET;

▶ Make and realise an action plan for CBVET curriculum redesign;

▶ Specify changes in the teaching-learning process which are consistent with CBVET principles;

▶ Move from assessment of learning towards assessment for learning and assessment as learning in CBVET;

▶ Include authentic learning experiences in the field of study in CBVET;

Teacher education and professional development in CBVET
These lessons are mainly based on research in the Netherlands, Europe, Indonesia and Uganda.

▶ Redesign teacher education by making it competence-based – make teacher education hybrid;

▶ Link teacher education up with schools and make the working place a structured learning place;

▶ Make vocational teacher education a first choice of study;

▶ Stimulate an entrepreneurial, research and transformational attitude;

▶ Create possibilities for teachers to keep up to date with development in the working field;

▶ Focus on competence development of teachers which will enable them to teach their students for an unknown future.

VET quality assurance
These lessons are mainly based on Barabasch (2017).

▶ Develop and apply quality standards for CBVET

▶ Develop and apply procedure for quality assessment of CBVET

▶ Develop procedures to implement quality recommendations in CBVET

▶ Monitor quality improvement progress – midterm self-evaluations in CBVET

9. Conclusions

Finally, the following conclusions are drawn from the previous sections. First of all, there is a wide variation in competence policies and practices. These have been reviewed partially in this paper. For a more extensive review see the contributions in the edited volume on competence-based vocational education (Mulder, 2017a). As will be clear, worldwide, competence-based practices, including CBVET, are more popular than ever. The concept of competence has a long history, but is now institutionalised in various ways. Competence-related systems features in CBVET are clear by now, which was not the case during their first implementations. Many things went wrong, because educational institutions had to invent the wheel, as no examples and evidence-based practice were available. However, a current global overview of competence theories and practices has now been published (op. cit.), which may help to shed light on the many issues involved in CBVET. Looking back on developments, it is also clear that many competence-based education initiatives concentrated on known tasks and present jobs. It is high time that we concentrate on competence needs for the unknown future. A first proposal has been made to define future-oriented competencies.

The implementation of these in CBVET practice remains an issue, for which various recommendations are given to avoid pitfalls and find solutions. Hopefully these help to improve the quality of CBVET where needed and possible.

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Part II:
Conducive Factors for Learning
on the Level of the Individual Subject
and the Work Environment

Alison Fuller and Lorna Unwin

► Improving Workplace Capacity as the Prerequisite for Effective Work-based Learning: A Co-production Approach

1. Introduction

Wherever vocational education and training (VET) takes place, it is constantly being challenged about its relevance to the world of work. This challenge is usually directed at the providers of VET (vocational schools, colleges and universities) by policymakers who oversee and regulate VET at a regional, national or supranational level. Providers are urged to improve their partnerships with employers, vocational teachers are urged to continually update their industrial skills, and vocational students are told to focus on their 'employability skills'. Little is said about whether employers might also need to reflect on their own capacity to create and manage suitable environments for work-based learning. The assumption is that employers are the experts when it comes to skill formation and providers must respond accordingly.

Employers are viewed as an homogenous group, regardless of their size, product market, and managerial capacity. The term 'employer' is used in a very elastic way, stretching from the multi-national company at one end to the small family business or self-employed individual at the other. As a result, skills policies focus on supply-side matters such as the structure, content and assessment of training programmes, funding procedures, and institutional arrangements. They tend to ignore the problem that some (perhaps many) workplaces are not configured in the most conducive way to support and benefit from those programmes or to capitalise on the learning potential of their employees.

Yet, the most effective training programmes emerge when both providers and employers take and share responsibility for their co-production. This blending of expertise is critical for the design and delivery of work-based learning where the workplace becomes the predominant site for the development of occupational expertise. The concept of 'co-production' was first developed in the 1970s by Elinor Ostrom and colleagues in relation to the involvement of citizens in the design of public services in the United States (see Alford 2014). It has since

been used in a range of contexts. For example, the Economic and Social Research Council in the United Kingdom (UK) is exploring a co-production approach to knowledge exchange between universities and the communities in which they are located.[1] In this chapter, we discuss practical ways to co-produce a more expansive and relational approach to VET in general and work-based learning in particular, one that is capable of meeting and adapting to the fluctuating needs of individuals, employers and society more generally.

The ideas we present here have emerged through our research over a number of years on work-based learning, and in particular apprenticeship, in a range of occupational sectors. They have also been influenced by collaborations with a range of organisations in the United Kingdom (UK), including, for example, vocational colleges, a hospital, a teachers' trade union, a multi-national engineering company, and a housing charity, all of whom have been concerned to improve the learning potential of their workplaces. Recently, we have also worked with one of the UK's leading training experts who works closely with employers (from multi-national companies to small and medium sized firms) based in advanced manufacturing sectors.[2] These collaborations have strengthened our belief that VET providers and employers (regardless of sector or level of skill requirements) can benefit from jointly using analytical tools to help them co-construct work-based learning programmes tailored to their specific circumstances. This requires both parties to understand and acknowledge each other's expertise in order to co-produce new ways of thinking and, hence, further develop that expertise.

Rapid technological changes are taking place in the way goods and services are produced, sold and consumed at the same time as increased volatility in trading relationships between countries and financial instability across the world. This is all having an impact on how we determine which skills and types of knowledge need to be developed and which are deemed to be 'relevant'. Designing and managing work-based learning programmes, however, pose considerable challenges for both educational institutions and the workplaces involved. These challenges exist regardless of the level of programme (e.g. for school, college or university students, or professionals seeking to develop their expertise), the nature of the programme, or the cultural context in which it takes place. In discussing the challenges, this chapter is concerned with the following core questions:

1. Why do some workplaces create better environments for learning than others?
2. In what ways can work be organised to stimulate and support learning?
3. How might employers and work-based learning providers co-produce programmes that help improve workplace learning capacity as well as developing individuals' expertise?

1   See for details: http://www.n8research.org.uk/research-focus/urban-and-community-transformation/co-production/

2   We acknowledge the contribution of Lee Weatherly, Chief Executive Officer of Midland Group Training Services in Coventry in the English West Midlands to the development of some of the ideas in this chapter.

The chapter is divided into five further sections. Our overall aim is to provide ideas for the conversations between employers and work-based learning providers that enable them to co-produce the types of learning experiences and environments that will foster the development of occupational expertise. We also indicate where students, apprentices and trainees could also be included in the conversation. It could be argued, of course, that they should be fully involved from the start.

2. Understanding the workplace as a site for learning

Workplaces have increasingly begun to be recognised as sites in which learning, broadly defined, is embedded in everyday activities as well as occurring as part of deliberately organised training interventions. Research is also shedding more light on the ways in which theories and concepts are utilised as part of work practice and how this, in turn, can lead to the transformation and creation of new forms of knowledge (see, inter alia, Guile, 2010; Beckett & Hager, 2002). As Billett et al. (2008, p. 99) argue, '…workplaces can be highly generative of much of the knowledge required for work performance'. Going still further, researchers are also exploring how employees themselves, through their everyday participation in work practices can be a source of what Høyrup (2012) calls 'employee-driven innovation', and how the way work is organised underpins the learning and innovative capacity of the workplace (Fuller et al., 2018). Yet, work-based learning is often still perceived as an educational issue, rather than a process that requires the equal attention of both the work and education contexts. The dynamic nature of the contemporary production of goods and provision of services challenges work-based learning to put work more centre-stage in order to keep up developments in thinking about how workplaces perceive the meaning, use and generation of skills and knowledge (Unwin, 2017).

All workplaces are dynamic sites of human activity providing opportunities for learning of different types and at different levels of intensity. The rapid advance of communication technologies, including social media, has meant more and more people treat their homes, cars and other forms of travel as workplaces (see Felstead et al., 2005). The primary goal of workplaces (including educational institutions) is to produce goods and services. As such, where 'learning' fits in a workplace's strategy is found to vary considerably. It is important to acknowledge, of course, that not all workplaces provide decent employment conditions and/or produce goods and services that properly utilise the expertise of their workforces (Sawchuk, 2006; Rainbird et al., 2004). Regardless of their nature, all workplaces are sites of conflict and tension. It is dangerous, therefore, to make assumptions about which types of workplace afford the best conditions for learning. Providers of work-based learning programmes have to negotiate the politics of working environments and acknowledge that they may even contribute to further tensions if access to learning is treated as an exclusive opportunity for certain employees.

The challenge when designing work-based learning programmes is to capitalise on the ability of the workplace to create conditions for different types of learning. Most workplaces have the potential to create the characteristics that are found in what we have elsewhere termed as 'expansive learning environments' (Fuller & Unwin, 2004; Fuller & Unwin, 2016). As our research has shown, due to their dynamic nature, workplaces exhibit these characteristics to a greater or lesser degree according to their circumstances and the level of agency exerted by employees (at all levels) to enact the changes required to reduce the tendency in workplaces to become more 'restrictive' in their behaviour. We discuss these characteristics in more detail in the next section.

In order to understand why workplaces vary so much, even when they make and deliver the same goods and services, we have found it helpful to use the economic concept of the 'productive system' (Felstead et al., 2009). Each workplace (whether in the public or private sector and whatever the size or nature of its work) is part of a productive system. The system comprises two interlinked dimensions which capture the social and technical relations that comprise the process of production: (a) the vertical interconnections of scale, or 'structures of production', ranging from international regulation down to the individual workplace; and (b) the horizontal interconnections or 'stages of production' through which materials are transformed into goods and services. Education and training institutions, like hospitals and other public sector organisations, are part of a government-led productive system and so subject to various forms of regulation and interference in the same way as a private sector company might be subject to the demands of its shareholders or to the family or individual that owns it. This means the concept can be applied in both formal and informal economies.

The nature of the productive system has an impact on the extent to which a workplace can create and sustain itself as a learning environment. If we use the example of a factory manufacturing components for cars, the factory sits at a point on the vertical axis with various layers of control (e.g. the international and/or national agency regulating standards for components, and the parent company, which might reside in a different country to the factory). Below the factory will be the firms in the supply chain providing raw materials, which form the first stage of the horizontal axis (the stages of production). The position of a workplace at the point where the two axes meet (structures and stages) will condition employer behaviour with regard to the extent to which they plan and make decisions for the short, medium or long-term, the risks they are prepared to take, and the levels of discretion they are prepared to give to employees. A workplace that forms part of an organisation whose owners are based in another country may be quite detached from the place where decisions are made about how the workplace should be managed. Public sector workplaces in the United Kingdom (UK) exist within a productive system controlled by the national government which sets performance targets and these in turn will have some effect on the way those workplaces are configured.

Other forms of regulation and control include the role of artefacts in the workplace (Fuller et al., 2007). For example, in supermarkets, the device known as the 'symbol gun' is used

to control and monitor stock levels, and to connect stores with the computers at the head office so that, in turn, the performance of stores can be constantly measured. In educational institutions, student achievement is measured and recorded in various ways (e.g. through examinations and attendance in classes), whilst in manufacturing plants, charts will be displayed showing the extent to which production targets have been met. These artefacts can play an important role as catalysts for learning, but they might also be seen as restricting learning if they represent forms of control that impede employees' ability to make decisions based on their expertise.

The productive system concept should not be seen as ignoring the role of individual and collective agency in the workplace. Individuals working alone or collectively can and do exert agency. They co-construct opportunities for learning by problem-solving (sometimes involving clients and customers as in, for example, the software engineering sector or in health care) and can directly arrange for work to be re-organised so as to facilitate more opportunities to share expertise and ideas.

An individual's employment status, the levels of discretion individuals have to make judgements, the extent to which employees are involved in decision-making, and the nature of the power relations within the workplace, all contribute to the nature of the workplace as a learning environment. For some individuals, exerting agency has to be done 'under the radar' of management through the process of what Wrzesniewski and Dutton (2001) have termed 'job crafting'. This enables individuals to utilise their skills, knowledge and experience to a fuller extent than is designated in their job descriptions (see Fuller & Unwin, 2017, for a case study of hospital porters). Thus, the environment contributes to the shaping of an individual's identity and, in turn, the individual, on their own and in relation with others, (re)shapes that environment (see, inter alia, Billett & Somerville, 2004; Hodkinson et al., 2004).

In some workplaces, managers have little discretion in how they organise people and work tasks. This may be because the way the people and work they manage in their workplace is largely dictated from a head office or government department some distance away. It might result from the pressure of meeting production targets, restricting managers' freedom to try new arrangements. In other workplaces, managers and employees may have much more freedom to innovate and create work patterns that they feel enable them to fully utilise their expertise. This could be because there is a single owner with an intuitive understanding of how to maximise the learning potential of their organisation. In some cases, managers and employees exert sufficient agency to challenge the pressures of the productive system in order to reorganise the way they work. As researchers, we have used the metaphor of the Russian Doll to focus our own attention on looking within workplaces to make sense of the intricate nature of the ways in which they are formed and reformed in reaction to their circumstances (Unwin et al., 2007). The act of separating out the different components enables us to ask questions about the nature and function of the layers that lie behind the mask on the surface. We then have to put the doll back together to restore the meaningful whole.

Having some understanding of how a workplace (or workplaces across an organisation) is affected by the productive system in which it sits forces us to see each workplace as a unique environment. As such, it puts a break on the tendency to make assumptions about whether a particular workplace might provide better or worse conditions for learning. Furthermore, in any provider-employer relationship, there will be constraints on both sides as a result of the productive systems in which they have to operate.

3. Beginning the conversation

The starting point for the approach we are proposing is a discussion between a provider and an employer about the current work process, the associated demands emanating from parts of the productive system (which might be external and/or internal to the workplace), and any goals for planned change. The following diagram (Figure One) captures the way Midland Group Training Services (MGTS) and an advanced manufacturing company mapped the company's shift away from its current mode of traditional production-line operation towards a higher technical level and a more adaptable form of operation.

Table 1: Transitional Skill, Knowledge and Behaviour Mapping				
Steady State		**Improved Performance**		**Step-Change**
Monitor skill needs and capacity across company in relation to: ▶ Business demand ▶ Work process and organisation of work activity ▶ Skill mix at level of teams and individuals ▶ Some consideration of potential to 'stretch' the current capacity of employees to upgrade their expertise ▶ Performance targets ▶ Maintenance of profit margins	MARKET ALIGNMENT	More pro-active approach in relation to: ▶ Impact of increased automation ▶ Reduced resources ▶ Demand for better productivity ▶ Improving quality across the work process ▶ Upgrading technical and scientific knowledge across the whole workforce ▶ Increasing profit margin	MARKET ALIGNMENT	Skills and learning positioned as being fundamental to enable: ▶ Innovative step-changes in work process and organisation ▶ Upgrading of skill, knowledge and behaviour sets directly connected to growth in innovation ▶ Emphasis on promoting long-term growth rather than short-term profit margins

It is noticeable from this diagram that the terminology relates skill requirements to business need and does not include, at this point, references to training programmes. The purpose is to enable a conversation between the provider and the employer that uses the bullet points as prompts to discuss and flush out not only the company's specific training needs, but also the scale of the ambition it has regarding workforce development. Many employers may, of course, be locked into or wish to remain in the 'steady state' frame of mind. Some may even need to be supported to have a conversation at the 'steady state' level. This will include workplaces that demand little beyond basic skills due to the low-value products and services they

produce. It will also include workplaces where managers are reluctant to challenge or acknowledge barriers to development from within a particularly restrictive productive system. And there are workplaces where managers and employees want to upskill and transform their work processes, but have not themselves experienced a more expansive approach to workforce development.

This is where an analytical approach that starts with the demands of the work process can be very helpful and where starting with an attempt to 'sell' training as a product is inappropriate and often counterproductive. The notion of 'market alignment' is then relevant to both provider and employer. Providers need to think about how to align their service offer with what the employer requires, and employers need to think about how their business (including the skills of the workforce) aligns with the market in which they are or wish to be operating.

In the next section, we explain how we have operationalised what we term the 'Expansive-Restrictive Framework' as an analytical tool to enable providers and employers to co-construct work-based programmes. We return to the MGTS example later in the chapter to show how the framework was used in practice.

4. Using the Expansive–Restrictive Framework

We have developed the Expansive-Restrictive Framework from our research in a range of contexts and it is continuing to evolve through feedback from the employers and providers who are using it. The framework does not represent and should not be used as a binary model – workplaces will shift along the continuum from 'expansive' to restrictive' as a result of the internal and external pressures emanating from the productive system in which they operate. Within medium-sized and large organisations, comprised of multiple workplaces, some environments may be more expansive than others due to the way work is organised and managed and the level of involvement of employees. Nor should the framework be used in a 'tick box' manner. It has been designed to generate questions for debate and discussion within organisations and between partners. The questions focus on workplace characteristics at three levels: the macro level of the productive system; the meso level consisting of structural features such as employment relations; and the micro level involving everyday interactions and relationships among employees. The 'answers' can then be used to identify key areas for development to help create more 'expansive' opportunities for individuals and for the achievement of organisational goals.

At the expansive end of the continuum, we find employers (of all sizes in all sectors, public and private) who understand that employees involved in any form of skill development need to be afforded a dual identity as workers and learners for the duration of their training, whether they be apprentices or employees involved in shorter and less substantial programmes. In restrictive environments, apprentices are moved as quickly as possible to

being productive workers. More expansive workplaces try to ensure that short-term production pressures do not harm the longer-term goals of both the organisation and the individual.

Partnerships based on a shared expansive ambition place demands on the actors involved (particularly managers) to be more pro-active in how they think about learning. Management comes to be seen itself as a form of 'pedagogy' rather than as solely being a form of control. This involves: a) having trust in and respect for employees' expertise and capacity to make informed judgements; b) involving employees in decision making; and c) organising work (including physical spaces) in order to support the sharing of knowledge and skills across job boundaries (Fuller & Unwin, 2010).

The implications of this approach for work-based programmes are considerable as they require attention to be paid to the future potential of both the workplace and the individual rather than focusing entirely on the immediate demands of a specific job role or production process. In Figure Two, we see how the framework can be used to generate questions about the design of a work-based learning programme (WBLP) for apprentices and other types of trainee, including for example university graduates. Each characteristic (e.g. C1, C2 and so on) can be explored in terms of how the employer and provider can create the conditions to maintain an expansive approach and to what extent circumstances might pull the programme towards a more restrictive approach.

Table 2: The Expansive–Restrictive Framework in the Context of Apprenticeships and Traineeships

EXPANSIVE	RESTRICTIVE
C1 Apprentice/trainee develops occupational expertise to a standard recognised by industry.	WBLP develops skills for a limited job role.
C2 Employer and provider understand that WBLP is a platform for career progression and occupational/professional registration.	WBLP doesn't build the capacity to progress beyond present job role.
C3 Individual has dual status as learner and employee: explicit recognition of, and support for, individual as learner.	Status as employee dominates: limited recognition of, and support for, individual as learner.
C4 Individual makes a gradual transition to productive worker and is stretched to develop expertise in their occupational field.	Fast transition to productive worker with limited knowledge of occupational field.
C5 Individual is treated as a member of an occupational community with access to the community's rules, history, occupational knowledge and practical expertise.	Individual treated as extra pair of hands who only needs access to limited knowledge and skills to perform job.
C6 Individual participates in different communities of practice inside and outside the workplace.	Training restricted to narrowly defined job role and workstation.

EXPANSIVE	RESTRICTIVE
C7 Individual's work tasks and training closely mapped against recognised occupational standards and assessment requirements to ensure they become fully competent.	Weak relationship between workplace tasks, occupational standards and assessment requirements.
C8 Individual gains forms of certification that have labour market currency and support progression to next level (career and/or education).	Individual doesn't have the opportunity to gain valuable and portable forms of certification.
C9 Off-the-job training includes time for reflection and stretches individual to reach their full potential.	Supporting individual to fulfil their potential is not seen as a priority.
C10 Individual's existing skills and knowledge recognised and valued and used as platform for new learning.	Individual is regarded as a 'blank sheet' or 'empty vessel'.
C11 Individual's progress closely monitored and involves regular constructive feedback from range of employer and provider personnel who take a holistic approach.	Individual's progress monitored for job performance with limited developmental feedback.

The labelling of the characteristics, C1-C11, is a device to enable those involved in work-based learning to use the continuum as an analytical tool. The idea is not to judge 'restrictive environments' as being worthless, but rather to ask how they might change to move towards the expansive end of the continuum. The characteristics C1, 2, 3, 4, 5 and 6 could be used, for example, to devise a set of initial exploratory questions to frame a discussion between employers and vocational training providers about why they are, or want to be, involved in apprenticeships or work-based learning more broadly. This can help to identify the primary motives for involvement and any misunderstandings or misconceptions about those motives.

▶ If you are an employer, why are you running apprenticeship/traineeship programmes? Is there a strong business case for employing apprentices/trainees?

▶ How does this programme fit in with your wider workforce development strategies?

▶ If you are a work-based learning provider, what do you want to achieve from this partnership and what do you see as the key benefits for the employer?

C4, 5 and 6 can be used to extend these questions:

▶ Will the proposed length and breadth of the programme provide sufficient time and space for the individual learners to become fully proficient in the skills and knowledge required to perform at the level required in the workplace?

▶ Are we (as employers) expecting individual learners to be productive too quickly?

▶ Are we (as providers) expecting too much from individual learners in relation to study demands away from the workplace?

▶ Do we (employers and providers) need to give individual learners more time to practice their skills and broaden and deepen their knowledge?

Characteristics C7 to C11 relate to the ways in which apprentices/trainees develop skills and knowledge and have their progress assessed and monitored. They can be used to formulate a set of questions about how the training is organised and who is involved:

▶ Is the content of our programme stretching enough?

▶ Do we know enough about the skills and knowledge individuals bring into the programme and ensure that this prior learning is utilised and built on?

▶ Does our assessment process tell us enough about our learners' progress?

▶ Are we as partners equally involved in the assessment process?

▶ In what ways could we further strengthen our partnership to improve the connections between the in-work and out-of-work elements of the programme?

We now return to our case study example to discuss how the work-based learning provider, MGTS, conceptualised its work with employers in relation to the Expansive-Restrictive Framework. MGTS devised a 'gold', 'silver' and 'bronze' categorisation to position the companies it works with along the Expansive-Restrictive continuum according to their approach to skill formation, improvement and utilisation in relation to their business goals. This is shown in Figure Three below. For MGTS, the level of co-production involved in designing training interventions, and work-based learning programmes more generally, increases when companies understand that the creation and nurturing of their workplaces as expansive learning environments is central to their business growth. The 'gold' companies have reached this understanding. Companies in the silver category are developing this understanding, but they have further work to do. The bronze companies are struggling to shift their thinking and practices away from the restrictive end of the continuum. In each category, MGTS work with the companies to create and further enhance the pedagogical approaches both inside the workplace and in the MGTS training centre that will facilitate skill formation, skill improvement and skill utilisation. In turn, this co-production approach challenges MGTS to reflect on the capacity and development of its vocational teachers and trainers.

As we stressed earlier in this chapter, however, this is not a static landscape. Each company's position in the diagram reflects a combination of structural, human, and productive system factors that are constantly in flux. Applying a co-production approach, therefore, is not easy as at any one time the process will become vulnerable to forces affecting all the stakeholders involved. In the case of WBLP, there is a power relationship to be negotiated in terms of who is paying the costs of programme design and how far the stakeholders are will-

ing to commit to the task. The challenge for MGTS is to work with all their business clients to help them achieve their goals and encourage them to expand their horizons.

Table 3: A Developmental Model for Co-producing More Expansive Skill Formation, Improvement and Utilisation		
Expansive (Gold)	**Silver**	**Restrictive (Bronze)**
Technological and business innovation generates skill demand – WBLP not confined to mandatory national competence standards. Pedagogical skills developed and distributed across the workforce including coaching and mentoring capacity.	Reviewing scope and appropriateness of business model and associated approach to training and development. Questioning the pedagogical capacity of the workforce and capability to provide coaching and mentoring.	Business model generates limited potential for reorganising work process to utilise and raise level of skills. 'Just-in-Time' approach to training. Pedagogical skills and responsibility limited to designated staff – lack of recognition of informal coaching and mentoring.
Role transformation possibilities across workforce. Opportunities to monitor alignment of changes in work process and skill formation. Range of teaching and learning approaches used and resourced – employees/trainees involved in their design.	Aspiration to develop business strategy and acknowledgement that realising goals will require upskilling across the workforce. Appreciation that existing teaching and learning approaches are insufficient, and that involving employees and trainees in their design could be valuable.	Business strategy dominated by minimising costs – training seen as a 'luxury' for specific employees. Range of approaches limited by trainer/teacher preference and resources.
Physical spaces available for employees to interact away from immediate work stations.	Appetite to consider how physical spaces could be reconfigured to provide opportunities for interaction.	Physical space dedicated to production – informal employee interaction regarded as time-wasting.
Employees (at all levels) encouraged to contribute their ideas – discussed in teams and distributed through easily accessible means. Feedback loops from ideas generated through the work process to design of WBLP.	Reviewing employee involvement and employees capacity for workplace innovation. Starting to think about how a feedback loop between ideas generated through the work process and the design of WBLP could be enhanced.	Employee involvement seen as too time-consuming. Teaching and learning play limited role in stimulating business improvement.

5. Implications for vocational teachers and trainers

When work is placed at the heart of work-based learning, the following questions arise for stakeholders as programmes are being designed, implemented and re-developed:

▶ How far do we understand the social and technical relations of production in the workplaces involved in our programmes – does work organisation hinder or facilitate both personal and collective learning? Can work be re-organised both to foster learning and business development?

▶ How far do our programmes expose the range of knowledge sources available in the workplace and to what extent do they and work practices map on to the curriculum undertaken in the vocational school/college setting? What opportunities are there for our programmes to extend existing knowledge in the workplace and underpin the development of work practices?

▶ To what extent can we identify opportunities for the assessment of everyday workplace activity as part of the overall assessment regime of the programme and to what extent can we capitalise on the potential for assessable 'projects' within the workplace?

▶ To what extent does the vocational pedagogy characterising our programmes recognise and support the relationship between personal and collective 'knowing' that arises from the social nature of learning at work?

Individuals relate to the work element of their lives in different ways and, hence, the value and meaning they place on learning that is 'work-related' (Billett & Somerville, 2004). So a key meta-question for vocational educators and trainers, employers and policymakers when considering work-based learning has to be: 'What is our purpose and focus and to what extent does it take account of (and address) diverse learner engagement?' A series of sub-questions then follow:

▶ Is the primary focus of our work-based programmes on learning that is necessary to produce goods and services efficiently?

▶ Is it on learning that develops an individual's occupational expertise?

▶ Is it on learning that develops the competence and capability of work teams?

▶ Is it on learning that extends beyond the boundaries of the work setting to encompass knowledge and skills related to being an active and responsible citizen?

▶ Is it on learning that leads to innovation in and transformation of the work process and organisational performance?

▶ Is it on learning that will provide a platform for the individual's further progression and lifelong learning?

These questions necessarily overlap and can be used to trigger discussions about how far expertise can be developed in one setting and the extent to which exposure to more sites and/or more people will be required to achieve the objectives of the programme. They can also be used to analyse existing work-based programmes to see how they might be improved and expanded. Answering the questions will, of course, depend on where one sits in the network of stakeholders involved in the design and management of the programmes. Recognising the diversity of perception is part of the complexity of work-based learning, but is also fundamental to the powerful way in which this form of learning can fuse divergent aims and purposes into a rich experience.

Vocational teachers and trainers are sometimes described as having 'dual identities'– as a vocational/technical specialist and as a teacher/trainer. A key aspect of their expertise involves recontextualising the way skills and knowledge are defined in the workplace so that they can be further developed in off-the-job settings (Evans et al., 2011). This includes translating concepts and applications from work processes into curriculum materials and teaching/training resources, and combining them with theoretical knowledge drawn from relevant disciplines such as mathematics, physics and chemistry. They also have to create different types of learning environment and forms of pedagogical participation to best support the mix of theoretical and applied learning involved in VET programmes. In the approach described in this chapter, vocational/technical expertise is given as much weight as pedagogical expertise in the teacher/trainer's profile for both are needed to co-produce work-based learning programmes with employers. How that combined expertise is deployed will, however, vary according to the nature and level of the skills and knowledge to be learned, as well as the learner target group, and the purposes of the programme.

We are arguing that beyond having both pedagogical and business or technical expertise, vocational teachers and trainers also need to be able to recognise and be able to adapt their practice along a learning spectrum in relation to two inter-related variables. First, they must be able to adopt pedagogies that support a learner-centred approach. This is necessary for them to support work-based learners who need a great deal of support to enable them to be successful in their vocational/technical studies and, where applicable, to develop the work-readiness behaviours they will need in their work placements. At the same time, teachers and trainers will need to deploy pedagogical strategies to support work-based learners further along the spectrum who can work and learn at a high level of vocational/technical specialism (and also to support learners located at all the different points along the spectrum).

Second, vocational teachers and trainers have to be able to conceptualise the workplace dimension, differentiating between settings where the employers' requirement is for training that supports their business at a 'steady state' and those aiming for a transformative step-change in their production of goods or services. If these two capabilities are inter-related, the steps and stages on the journey can then be analysed as part of the process of curriculum design involving both on and off-the-job settings. Again, the co-production process means that

teachers and trainers have to understand the technical aspects of the work process to engage in both the initial conversations with employers and to then lead the recontexualisation that is required to support a transformational shift in market alignment. During the whole process, there will be opportunities for the partners to discuss the potential for a more expansive approach, either for the whole programme or certain elements. It will also identify opportunities for continuing professional development (CPD) to enable teachers and trainers to increase their vocational/technical expertise, perhaps through work placements, as well as for workplace personnel to develop their pedagogical expertise.

6. Conclusion

In concluding this chapter, we draw attention to a surprising paradox that has implications for the development of effective work-based learning, namely that educational and training institutions (schools, colleges, vocational centres, universities) tend not to see themselves as workplaces. This puts the vocational educator or trainer in the curious position of not being able to reflect on the learning they do in their own workplace in order to model that experience when designing work-based programmes. The creation and management of effective work-based learning programmes requires all the stakeholders to develop an understanding of the dynamic nature of how learning occurs and is generated within the workplace (however defined). In addition, work-based learning has to balance the needs and aspirations of individuals, of the workplaces and education, training institutions involved, and, other potential stakeholders, such as sectoral or professional agencies and also governments.

Vocational teachers and trainers and their managers would benefit from reflecting on the characteristics of their own 'workplace' when thinking through the connections between the way work is organised and the potential for learning arising from work activity. This may require a new approach to the way work is organised and the design of workspaces within educational institutions to enable much greater team working, collective learning and sharing of expertise. Vocational teachers and trainers, and others (including policymakers) within the productive system of education and training might begin by asking themselves the following questions:

1. What is my workplace like as a learning environment?
2. Are there opportunities for shared reflection, problem-solving and goal-setting within the team?
3. How much control do I have over the way my work is organised, executed and evaluated?
4. How much discretion do I have to make decisions and judgements on my own?
5. How do I continue to develop my expertise at work and to what extent can I call on the support and expertise of colleagues?
6. To what extent do I have the opportunity to work in a 'multi-disciplinary environment', and learn from colleagues with different areas of expertise and experience?

7. Does my workplace recognise the value of peer support?

8. Does my workplace recognise the value of opportunities for learning from beyond this setting e.g. via conference attendance, secondments, study visits etc.

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Christian Harteis

► Supporting Learning at Work in an Era of Digitalisation of Work

1. Introduction

The history of industrial development since the 18th century is also a history of technological, economic and societal changes, which, at each of their phases, had crucial impacts on workplaces and work practices. Technical inventions and innovations had always induced workers' adaption. The most important driver had always been technological development, which culminated in the invention of new machines that improved industrial production. The current transformation of industrial production to digitalised work is often called the fourth industrial revolution (e.g. in Germany *Industrie 4.0*), even though there is a debate about the rationality of this counting system (e.g. Wilkens, 2017). This counting system considers the invention of steam power and its utilisation in mechanical production systems (i.e. the first, mechanical 'power loom' in 1784) to be the first industrial revolution. The second revolution followed in 1870, when the implementation of the principle of the division of labour was combined with the use of electric power in driving a conveyor belt in a Cincinnati slaughterhouse. A third revolution is the application of the first programmable logic controller in 1969 for broad use in IT and electronic systems in order to increase the automation of industrial production. Currently, information and communication technologies have developed so far that the fourth industrial revolution appears to have occurred in recent times, due to the use of cyber-physical systems in industrial production (Brynjolfsson & McAfee, 2014). Hence, the question arises as to what the particular qualities of cyber-physical system implementation are.

Cyber-physical systems are arrangements that combine software components with mechanical parts that communicate autonomously via the intranet or internet. Such combinations allow for production arrangements that vary flexibly according to affordances or constraints in the order books or production systems without necessarily being directed by workers. In car manufacturing, for example, the combination of software components with mechanical parts is already widely used. A regular model from a western car manufacturer can be ordered in several million formats when all the possible configurations are con-

sidered. In production plants, all these differently configured cars run consecutively on one production belt, and the information on the required components is sent from the production unit in order to have all the components available at the exact moment when they are needed. However, future scenarios describe production units that allow for the production of goods in batch size 1 – meaning fully unique components – within a production system that organises resources and processes autonomously and automatically. Such a system sets new requirements that workers have to achieve: they have to be flexibly available, which means that they have to be permanently contactable, and they have to be able to cope with varying tasks. On the one hand, flexible work times may allow for the arrangement of work in accordance with individual needs and demands; on the other hand, employees' boundaries between the private sphere and professional sphere may blur, due to constant contact with their employers. Such flexible working arrangements may still be difficult to realise, however, as they may violate employment laws.

Digitalisation not only changes industrial work but also affects all economic sectors, including the primary sector of natural resources and the third sector of services. Consequently, workers or employees in all kinds of occupations and professions are potentially subject to changes due to digitalisation. Technological innovations have always raised questions regarding their effects on workers and working life. There are examples in which technological progress has improved working life (e.g. by replacing dangerous jobs with machines). However, current attempts to implement digitalisation are usually not clear-cut in this respect (Brynjolfsson & McAfee, 2014), so that the discourse on the effect of digitalisation emphasises either improving the quality of working life by alleviating workers' daily lives or diminishing the quality of working life by making existing skills and occupations redundant. Hence, any emerging technological development – even in its early phases – becomes an object of interest and speculation regarding its overall impact on work and worklife. The emergence and effects of the digitalisation of work, for both workers in particular and societies in general, are no exception here.

2. Dimensions of change through digitalisation

Even if, for the majority of workers and employees, the immediate effects of digitalisation are probably not visible yet, there are convincing indicators regarding the progress of digitalisation within the economy. A look at the most valuable companies on earth (Gandel, 2016) reveals that the top-five list contains Apple ($534 billion), Alphabet ($504 billion), Microsoft ($413 billion), Exxon Mobil ($326 billion) and Facebook ($321 billion). Four of these five companies create their business through digitalisation; only Exxon Mobil, as a petroleum refining company, represents traditional industry in this list. If one understands stock value as a bet or a promise on the future, investors scent the greatest chances for profits in the sector of digital economy. In certain realms, the dominance of the digital economy has already become a reality: for example, the world's largest taxi company (Uber) does not own any

cars, the world's most popular media owner (Facebook) does not create content, the world's most valuable retailer (Alibaba) does not have any goods and the world's largest provider of accommodations (Airbnb) does not own any property.

From an educational perspective, questions arise as to whether and how work in digitalised workplaces presents new challenges regarding the preparation of people for this kind of work (i.e. vocational education and training), for maintaining the quality of individual employability across one's working life, and for further education and learning in the workplace in order to develop and maintain required skills and capabilities. In general, digitalisation and its effects can be considered on three different levels: (i) technology, (ii) organisation and (iii) workers and employees.

2.1 Level of technology

To the same extent that technology changes the machines used for industrial and other types of work, workers' requirements change as well. Whereas earlier technological changes mainly resulted in increases in speed and power, information and communication technology may not only lead to more efficient (quicker or denser) processes, but this form of technology may also merge processes, introduce a variety of new processes and requirements and, thus, lead to an intensification of work. First, increased processing speeds and storage capacities allow for the application of increasingly complex software. Second, software solutions become increasingly complex, resulting in ever-improving problem solutions. Third, the quality of sensory technology increases quickly, so that adaptive assistance systems can be developed for a variety of challenges. This applies not only to sensors recording technical or geographical data (e.g. for autonomous cars), but also to sensors recording crucial characteristics of people operating digital machines (e.g. robots). Fundamental to all these opportunities are the algorithms that are implemented within the software, which essentially define the scope of options that are realisable in a concrete setting. The combination of these three factors may generate work processes with backgrounds that are inscrutable to workers. The machines generate and provide the structure for the work processes.

From an educational viewpoint, the type of anthropology that guided software developers is interesting and relevant. Since humans began producing and utilising tools, a specific anthropology was implicit to these tools. A hammer owes its specific shape, first, to its main purpose and, second, to the physiology of the human body. Analogously, each software solution is based on at least one inherent concept regarding the user, which is often not explicitly elaborated on.

2.2 Level of organisation

As a matter of course, technological change has effects on the level of organisation. As technological progress increased the speed and power of singular working steps, changes to work organisation applied only in terms of the human or mechanical capacities. However, the final

vision of cyber-physical systems foresees the smart factory with fluctuating and autonomously organised work processes that interpret singular production units within an organisation as flexibly available resources. Depending on the list of orders and the current availability of resources, singular production units are supposed to be allocated flexibly to different tasks as parts of the order list.

The fundaments of this system of production organisation (and work) can be found in late-1990s concepts of lean production with just-in-time deliveries (Hirano & Makota, 2006) and fractal enterprises (Bider et al., 2016). Both claim temporary and completely flexible organisational structures that arise when necessary and disappear when they are no longer necessary. Theoretically, these structures minimise machine downtimes that usually arise in traditional, linear production processes. The constraints of this means of organising work and production arise not only from humans' and machines' capacities, but also from their capabilities. The question that arises is not only whether humans and machines can cope with the speed and power of production processes, but also whether the tasks and capabilities fit. Additionally, the optimisation of tasks (orders) and resources (capabilities) will be calculated through algorithms, which finally brings machines to the point of organising (human) work. It is, as yet, an unresolved question whether digital leadership differs from the well-established management concepts of leadership and control.

2.3 Level of workers and employees

From an educational perspective, the individual level of workers and employees is of particular relevance, since the effects of digitalisation have a direct influence on work tasks and processes. As soon as work processes change, they require workers to learn and adapt. Some work processes will change, some will become obsolete and new ones will be established. Depending on the quality of these changes, a need for workplace learning, for further education or for a modified preparation for work through vocational education and training arises. The question of whether the demands of digitalised work will require a higher or a lower level of qualification and capability remains unanswered. It is probable that both directions will occur; some assistance systems aim to provide workers with all the necessary instructions and to guarantee safety within work processes, so that an individual just needs to follow the instructions of the system. This type of assistance system does not require highly skilled workers, provided that they do not oversee the entire system. As soon as assistance systems require workers to gain control over a system, the workers need to have an understanding of (probably convoluted) processes and algorithms. The digitalisation of work, hence, raises the issue of who should control and manage work processes: computer systems or workers. The first alternative would describe a renaissance of Ford's concept of the division of work, but the second alternative would require workers' capabilities and commitment.

The digitalisation of work not only influences skill requirements, but also the character of vocational, occupational or professional job profiles. Lewis (2011) investigated the habits of truck drivers in Australia and observed that they immediately switched off all the truck's

digital assistance systems as soon as they were on an overland road. They also, regardless of air conditioning, opened their windows just to hear the machine – something that is impossible in modern, high-tech trucks with sound-insulated cabs. These observations raise three issues: (i) technological development may annihilate aspects of work activities that create identity (i.e. contact to the rough work of an engine), (ii) technological development may also annihilate aspects of work activities that are actually important to one's experience of competence (i.e. the sense of feeling the engine) and (iii) technological development may be simply eluded by workers.

Finally, the digitalisation of work raises the issue, on an individual level, of data privacy and informational autonomy. Interactions between workers and digital systems generate a plenitude of data that can be utilised to control workers and analyse their performance. It remains unclear who the owner of this type of data is – is it the worker him- or herself? Is it the owner of the machines or the software provider? At any rate, it appears as if the worker has the lowest chances of receiving access to this data.

3. Educational challenges

A look at media and scientific discourses reveals that the public debate about the digitalisation of work is widely dominated by contributions from technological domains (i.e. software engineering or robotics) and business domains (i.e. work studies or management). However, as discussed above, the transformative process of the digitalisation of work is of educational relevance as well. Three perspectives are to be distinguished.

3.1 Philosophy of education

There are two major ideas that guide several approaches towards the philosophy of education: first, the autonomy of the individual is an important idea in education. In the context of individual development, the individual is to be acknowledged as having intrinsic value; hence, the individual has the right to decide what to do. Kant (1999) introduced the idea that it is the goal of education (and enlightenment) to encourage the individual to utilise his or her own understanding without receiving directions from another. However, there are limitations in individual freedom that arise from the social environment. The second important idea in educational philosophy refers to the integration of an individual into the social community as the major goal of education (e.g. Dewey, 1966). An educated individual is considered to understand and accept social rules; in other words, socially accepted behaviour results from insight into the value of social rules, in the form of maturity.

Many of the issues discussed previously directly challenge such an understanding of education. Digitalisation may result in less transparent work or decision processes as soon as machines directed by (hidden) algorithms begin to organise work processes. The debate over issues of control indicates the possibility – and perhaps the probability – of prioritising machines over humans. In a work situation described by the machine-controlled organisation

of work processes on the basis of hidden algorithms, it becomes impossible for the worker to oversee the system and develop a mature understanding of the entire whole. The educational idea of maturity becomes inappropriate and is replaced by the concept of proficiency, which describes successful individual subordination under external, opaque goals.

3.2 Value of work and individual competence

In situations in which machines control work processes as well as the creation of value, thus generating surplus, the issue of payment for work arises as a novel problem. A solution to this problem via market mechanisms would involve a type and extent of payment for machine work that reflects the efficacy gain generated by the machines. However, since machines and algorithms usually work faster and more constantly with the same amount of precision, machine work is resultantly better paid than human work. Some researchers call for a new social deal regarding what kind of work people are willing to be paid for (e.g. Ellis, 2007; Gorbis, 2013; Wunder, 2013). The extreme scenario in which machines generate all wages for a society – independent of whether a person works in an industrial, commercial or honorary context – seems fantastical. It seems more realistic that some occupations will become obsolete and that others will emerge (Frey & Osbourne, 2013); in consequence, there will be winners and losers.

Payment for work also reflects societal acknowledgement of competencies, skills or capabilities. Work requires particular, individual competencies, be it work in industry, a service area or any other field of business. Machine work reflects engineers' competencies that were necessary to the development of the machines and software. From an educational point of view, it becomes relevant what kind of competencies, skills or capabilities receive what extent of public acknowledgement, which is reflected in the payment amount. Historically, the domains of ICT, technology and engineering receive higher wages than larger service areas (i.e. logistics, care work or education).

3.3 Preparation for occupations, vocations and professions

If the digitalisation of work requires new skills, and particularly such that were not part of workers' vocational preparation, then it may be necessary to modify vocational curricula, particularly in countries with strong vocational education systems (e.g. Germany, Austria and Switzerland). These curricula were developed over a long period of time, include complex negotiations between stakeholders and may be comprised of components that are no longer needed in digitalised work.

Modifying vocational preparation by adding new requirements is probably an easier means of adapting vocational education. However, this can be rather difficult if the digitalisation replaces human work at fundamental working steps that particularly contribute to a comprehensive understanding of a domain. Computer numeric control of lathes, for example, does not require lathe operators to come into direct contact with the material they

work on. However, such direct contact (i.e. feeling, touching and working on materials with manual tools) allows workers to develop a sense of the quality of the material (e.g. capacitance or resistance; Harteis, 2017). The problem here is that the realisation that some crucial work activities have vanished does not occur without a noticeable delay, if it even occurs at all. An example should illustrate this issue: modern assistance systems in cars allow for fully automated reverse parking. Some time will pass before we will realise that the majority of car drivers have lost the manual skill of reverse parking, and it will take us even longer to realise that this manual skill is significant to other aspects of competent car driving.

Hence, it is obvious that the digitalisation of work will require adjustments in the systems of vocational education and preparation for work, and it is educational researchers' challenge, as well as duty, to contribute to and shape these necessary changes.

4. Workplace learning as the inevitable company of the digitalisation of work

Digitalisation and related transformational processes at work not only raise issues of how best to adapt vocational education, but also require thoughts on how to best help workers cope with the recent challenges of digitalisation. There is evidence that formal trainings cannot completely prepare workers for the challenges of digitalisation. The transformation of work requires learning directly in the context of work; in other words, challenges, problems and learning tasks arise within immediate workplaces and need to be solved (as soon as possible) within this setting. As a result, workplace learning can be a crucial contribution to the potential success of digitalisation (McAfee & Brynjolfsson, 2017).

4.1 Influences on workplace learning

It is the interactions between work environment conditions, workers' individual characteristics and subjective experiences that shape the influences on workplace learning. Within the educational sciences, workplace learning has become a well-established field of research (Billett et al., 2014; Tynjälä, 2013). While educational researchers previously investigated workplace conditions in order to improve learning within school settings, they currently acknowledge workplaces as rich sources of learning and professional development (Gruber & Harteis, 2011).

There is a body of interesting research on the individual characteristics that influence workplace learning. There are examples of cognitive, motivational and emotional factors that may support or hinder workplace learning:

▶ *Cognitive factors*. There is evidence that epistemic beliefs – which are reflected or unreflected assumptions about the nature of learning and knowing – influence the perception of learning opportunities, particularly in workplace settings (Bauer et al., 2004a; Harteis et al., 2010). Somewhat similarly, the concept of error orientation describes individual beliefs about errors and how to deal appropriately with errors at work. There are empirical

studies that investigate the relationship between error orientation and learning and errors within workplaces (Bauer et al., 2004b; Harteis et al., 2008). These studies reveal that cognitive factors, such as subjective beliefs and assumptions, highly influence individuals' perceptions of their environment. These beliefs can develop in a rather naïve direction (e.g. learning has to occur quickly, or errors are incidents that need to be concealed) or in a rather elaborate direction (e.g. knowing is subjective, or errors are learning opportunities). It is rather plausible that the individual who has developed elaborate patterns of cognitive belief has advantages when it comes to workplace learning. Of particular relevance to digitalisation may be the construct of commitment to change, which allows for distinguishing how open or dismissive individuals are towards changes in their environments (Herscovitch & Meyer, 2002).

▶ *Motivational factors*. Educational research that focuses on the motivational influences of workplace learning often applies the self-determination theory of motivation (Deci & Ryan, 1985), which focuses on the subjective experience of autonomy, competence and social embedding as sources of intrinsic learning motivation (Harteis et al., 2004). Workplaces that provide opportunities for experiencing autonomy, competence and social embedding act as learning stimuli, whereas bureaucratic work environments tend to limit learning motivation and activities. This body of research not only reveals the importance of individual features, but also of the work environment.

▶ *Emotional factors*. While cognitive and motivational aspects of workplace learning have a long-standing research track, the emotional aspects have only recently received attention. It is particularly the issue of learning from errors at work that has raised researchers' interest (Rausch et al., 2017). Errors are quite an ambiguous topic in work contexts: on the one hand, we know that errors – particularly within complex, problematic situations that workplaces usually involve – cannot be completely avoided. However, quality management is aimed exactly at avoiding errors. Hence, it becomes important for workers to avoid the repetition of errors by learning from these errors. Emotions play an important role here: employees need to feel safe and free from fear if they are expected to communicate their errors in order to learn from them.

Besides these individual features, workplace conditions can either crucially support or hinder workplace learning. The workplace environment is comprised of the social world of individuals (e.g. colleagues and managers), the material world of physical artefacts (e.g. buildings and furniture) and nature and immaterial artefacts (e.g. interaction practices and commonly shared beliefs). Workplace learning requires both space and scope, which are provided through social interaction. Leading behaviour is a particular issue if workers sense that their work environment does not appreciate individuals who develop competencies, because these workers behave autonomously (Harteis, 2012). Schein's concept of organisational culture adequately describes the interrelation between beliefs, practices and artefacts. An organisa-

tion that succeeds in providing supportive conditions for workplace learning is characterised by a commonly shared appreciation of learning (Fischer & Pöhler, in press).

4.2 Challenges for workplace learning

All factors mentioned as influences in workplace learning also describe challenges, because they can take on either a supporting or hindering shape. Work usually follows the paradigm of productivity, which means that work is supposed to take place quickly and precisely. Learning during work usually inhibits the productivity of work activities. The crucial question that arises is how to best support workplace learning. This research began with the investigation of barriers; for example, Karasek and colleagues developed the job control-demand model (Karasek & Theorell, 1990). This model considers workers' subjective experiences of job demands (i.e. task difficulty, task variety etc.) and job control (i.e. self-efficacy and competence) as crucial dimensions of either wellbeing or malaise at work. This model is widely used in psychological research on work strain (Gijbels et al., 2012; Martin Hernandez, Salanova, & Peiro, 2007). Both of these dimensions can be arranged in a four-field table (see Table 1) that describes different work conditions.

Table 1: Work conditions concerning job demands and job control		
	Low Job Demands	**High Job Demands**
Low Job Control	(1) Passive Work	(2) Straining Work
High Job Control	(3) Senseless Work	(4) Active Work

Work psychology has widely investigated the strain hypothesis, which considers a combination of high job demands and low job control as straining work and a combination of high job control and low job demands as senseless work. Both conditions generate stress and do not positively contribute to workers' self-esteem. However, this model can also be read in a different - and, so far, less acknowledged - manner, in that a combination of high job demands and high job control constitutes an active work environment, which supports workplace learning (the learning hypothesis). Initial studies support and provide evidence for the learning hypothesis (e.g. Gijbels et al., 2014; Harteis et al., 2015).

However, even though enterprises claim to be learning organisations, the factually-established practices of daily worklife between employees (i.e. blue collars, white collars and management) provide the scope for workplace learning. Of course, tasks and occupations differ, and so does the learning potential within workplaces. However, it seems unlikely that workplaces' requirements will not change due to digitalisation. Hence, it is likely that employees in digitalised workplaces will have succeeded in formal training and workplace learning. Current findings indicate that workplace learning support differs across occupations; neither

age nor gender make a difference here, but there are higher-paid and better-perceived occupations that receive significantly higher support for learning at work than other occupations do (Harteis et al., 2015). The positive message of these findings is that neither age nor gender discrimination are a part of the workplace learning support equation, but the negative message is that the Matthew effect of accumulative advantage applies here. Hence, it is a managerial task to establish working conditions that provide workplace learning support for all employees (Harteis, 2012). It is clearly a top-down task to establish a learning culture within an organisation.

All these insights do not arise from contexts that recently underwent or are currently going through the transformation process of digitalisation. Caution is to be applied when interpreting these insights for potential challenges with respect to digitalisation.

5. Significance of educational contributions

Currently lacking a broad base of sound empirical evidence, debates on the effects of digitalisation within the workplace fluctuate between optimism and pessimism. Positive interpretations highlight the increase of opportunities that arise from the digitalisation of work for both workers and enterprises, whereas negative interpretations focus on the dangers that result from the opaque nature and unforeseeable consequences of digitalisation, potentially leading to situations in which workers are at the mercy of those who control these systems. Supporters of each position often represent special interest groups. There is an immense need for research to provide empirically grounded insights on the effects of digitalisation.

However, the consensus of moderate positions is that the digitalisation of work will not lead to workplaces without human beings, but will perhaps lead to new ways of working and knowing (e.g. Brynjolfsson & McAfee, 2014). Hence, the salient educational question is how best to prepare workers for this future of work and to design curricula and vocational education and training materials. However, it would also be interesting for educational researchers to investigate and understand the transformation processes and their side effects (particularly in respect of how they influence the individual).

If the digitalisation of work changes work structures and the organisation of enterprises to a fundamental extent, then educational research becomes relevant in the generation of knowledge regarding appropriate organisational structures and leadership. Educational research focuses on workers' opportunities for participation, experiences of competence and self-efficacy and development. Hence, it is important that educational researchers contribute to this debate in order not to abandon this field to the disciplines of business, engineering and ICT. It is the traditionally humanistic perspective of educational research that needs to be acknowledged, as well as all legitimate economic and technological concerns.

As we are currently in the initial phase of the transformation towards digitalised work and the implementation of cyber-physical systems within enterprises and organisations, society needs to begin discussing the socially accepted rules of digitalisation. In addition, this

discourse needs to be fed by different disciplines. As a result, it is important for educational research to generate insights into this issue in order to contribute to the social discourse regarding the rules of digitalising work.

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Stefanie Velten and Annalisa Schnitzler

▶ Assessing Work-based Learning in German Dual VET from the Apprentices' Perspective – the Development of an Inventory

1. Introduction – Work-based learning in German dual VET

In the German educational system, dual vocational education and training (VET) is fundamentally based on in-company training. Thus, work-based learning within VET is part of the formal educational system. Against this background, the assessment of the quality of training is part of the authorities' responsibility for the excellence of the formal system. There is unanimous agreement that the aims of their quality assurance endeavours should be that apprentices should be able and motivated to perform the tasks associated with their occupation, that they should be enabled to act autonomously in dealing with difficult tasks and in engaging in lifelong learning and that young people should successfully complete their final examination. Thus, training quality should foster the apprentices' motivation and their vocational competences.

Although there are many questionnaires trying to capture job or work characteristics, there is a lack of suitable recording instruments to assess the characteristics of company-based training in a reliable way. In our research project we decided to focus on self-reported work characteristics perceived by the apprentices themselves instead of supervisors' evaluations of the work and training environment or more 'objective' characteristics,[1] following Hackman and Lawler (1971) who argue that employees' behaviour and attitudes are primarily affected by the way they experience their work characteristics. To the best of our knowledge, only one instrument that permits the comprehensive surveying of company training quality has been put in place thus far. This is the "Mannheim Inventory for the Recording of Company-Based Training Situations" (MIZEBA) (Zimmermann, Windschild & Müller, 1999). However,

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1   However, there is research documenting that experimental manipulations of work characteristics result in varying subjective perceptions, implying a certain convergence between objective and subjective task characteristics (Fried & Ferris, 1987).

MIZEBA does not explicitly address the aspect of training staff despite the fact that trainers bear the responsibility for imparting training content and thus occupy a major role within the training system (cf. Bahl in this volume). In addition, some items proposed in the inventory seem rather too long and complex for the target group. Therefore, we decided to develop a new instrument to enable apprentices to assess the learning conditions in their training companies.

2. Previous research on factors affecting learning at work

To develop the "Inventory of Company Training Quality" (IBAQ) we first considered the ideas proposed by the occupational psychologists Hackman and Oldham (1975) in their Job Characteristics Model.

2.1 Job Characteristics Model

A central approach to describe fundamental characteristics of work tasks is the Job Characteristics Model (Hackman & Oldham, 1975), which has its origins in occupational psychology. The aim of the Job Characteristics Model is to identify conditions under which employees are able to achieve a high degree of work satisfaction, performance and intrinsic motivation. Hackman and Oldham assume that three mental states are required in order to reach these goals – a sense of meaningfulness of work, responsibility and knowledge of outcomes. According to their theory, these states of mind can be engendered by structuring tasks in a certain way (see figure 1).

Figure 1: Job Characteristics Model (adapted from Hackman & Oldham, 1975)
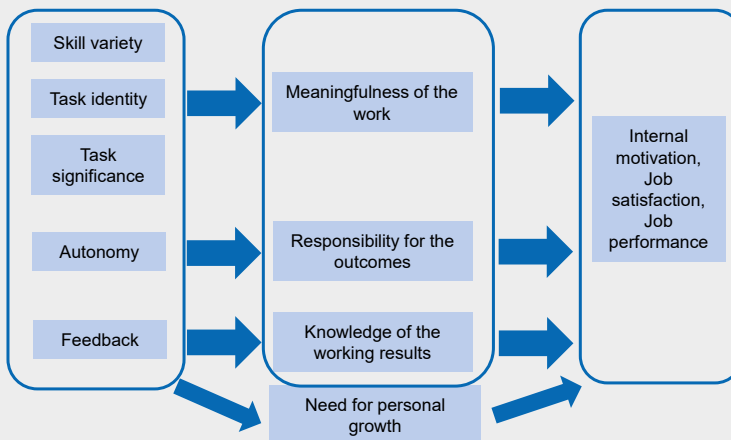
Their final theoretical model comprises five core task dimensions: skill variety (degree to which a job requires the use of different skills), task identity (the degree to which a job enables the employee to perform a task from the beginning to its end), task significance (degree to which the job has an impact on others), autonomy (degree to which a job offers freedom regarding task scheduling and procedures performed), and feedback (clear information about the quality of performance from the job itself but also from other people). Hackman and Oldham assume these dimensions to affect employees' critical psychological states that finally lead to personal and work outcomes like internal work motivation, job satisfaction, work performance and low turnover. Nevertheless, they restricted their model to individuals with high need for personal growth, which means that they expect at least employees trying to find self-fulfilment at work to be affected positively by favourable work characteristics.

In their meta-analysis, Fried and Ferris (1987) summarised empirical data giving evidence for the relationships between work characteristics and psychological outcomes like internal motivation as posited by Hackman and Oldham. Skill variety revealed the strongest relationship with internal motivation with a corrected $r = .52$ and task identity the weakest ($r = .22$). Associations with job performance were much smaller, but still meaningful. Bergmann, Baunack, Fritsch, Richter, and Wardanjan (1999) and Frieling and Grote (1999) emphasise that, from an employee point of view, feedback processes play a central role in the development of vocational competence. Regular constructive feedback, both of an informal and formalised type, on the performances and successes achieved in the training process also ultimately lays the foundations for successful learning at work. This ensures that possible errors are corrected in a timely manner. Secondly, constructive feedback procedures bring about a rise in task-related self-efficacy and in motivation amongst the learners.

Further findings regarding the significance of the work situation for competence development of employees are available from Bergmann et al. (2000). They identified correlations between autonomy, diversity of requirements and transparency of work tasks and the extent of self-evaluated professional, social and methodological competence. In a survey of public sector employees, Benninghaus (1987) identified task diversity as the best predictor for work satisfaction in particular (compared to decision-making scope and pressure in the workplace), although it also had an impact on self-esteem and a sense of competence. O'Brien (1982) additionally identified a match of the requirements which arise from the task and the abilities of the employee as a good predictor of work satisfaction.

As the Job Characteristics Model mainly focuses on work tasks, neglecting social interactions at work with supervisors, trainers and colleagues, we enriched Hackman and Oldham's suggestions by taking into account items reflecting social support and learning opportunities, as described in the following section.

2.2 Additional research addressing social interactions between apprentices and their trainers and colleagues

According to Frieling, Bernard and Bigalk (2006), a work environment that fosters learning is distinguished by task-related characteristics as well as by characteristics relating to social interactions in the workplace[2]. Müller (2009) notes that particularly complex work tasks, which offer the best learning opportunities, often need to be tackled in a cooperative manner. This requires an approach based on common patterns of thought and action, and these need to be imparted to the apprentices within the course of training. Therefore, learning needs to be embedded in a social context. This enables apprentices to "experience directly how skilled workers think and act within their field" and accordingly "take on [implicit] means of perception, thought and action, attitudes and ideals" (ibid., p. 118, own translation) to become part of an expert community themselves (cf. also work on "Communities of Practice", Lave & Wenger, 1991). However, according to findings that have emerged from research into the development of expertise and into the proceduralisation of knowledge contents, it is also essential that "skilled workers model their modes of thought and action" and "make their implicit strategies explicit wherever possible and give reasons for the approach they adopt" (Müller, 2009, p. 117, own translation). In the case of Müller, the perceived extent of integration into the expert culture exhibited positive correlations with the self-efficacy beliefs and learning motivations of apprentices. However, a large proportion of the apprentices in his survey bemoaned the fact that the skilled workers only sometimes verbalised their approach and thought processes to them when finding a solution to a problem. This means that we cannot assume that explicit reflection on work processes by experienced colleagues is standard practice in companies.

Beicht, Krewerth, Eberhard, and Granato (2009) pointed out that tasks structured in accordance with characteristics promoting learning can only have the desired effect if they are embedded in a positive learning climate. They see this climate as including mutual support, respectful treatment of colleagues and the absence of stress factors such as excessive time pressure when processing tasks. As Quante-Brandt and Grabow (2009) underline, time and performance pressures exert a particularly negative effect on apprentices' satisfaction and should be avoided, especially as they may also have a detrimental impact on mental and physical health. Similar to that, another important factor for work motivation is that employees should not feel under-stretched or over-challenged (cf. Zimmermann, Wild & Müller, 1999).

Requirements in terms of respectful and supportive behaviour of colleagues can also be generalised to include training staff. Feller and Theis (1996) conducted a written survey of 7,600 apprentices in various occupations and arrived at the conclusion that interpersonal relations within the company providing training were particularly instrumental to the success

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2   In fact, Hackman and Lawler (1971) integrated two scales "dealing with others" and "friendship opportunities" in their first theoretical model of job characteristics, but expulsed them in their final model.

of the training. The specialist didactic competence of the trainer also plays a crucial role in this regard. Within the scope of an expert survey (Krewerth, Eberhard, and Gei, 2008), two thirds of respondents deemed the professional and didactic competence of trainers – such as comprehensibility of explanations and instructions and mastery of training content by the trainer – to be a very important criterion in training quality.

These findings underline the importance of structuring the working and learning environment in such a way as to be conducive to the development of competence, intrinsic or internal motivation and self-efficacy. Consequently, an inventory addressing relevant working conditions from the apprentices' perspective is desirable. Considering the previous findings outlined above, positive correlations between work characteristics assessed with such an inventory and intrinsic motivation and self-efficacy are expected. However, excessive demands should reveal negative correlations with the outcome criteria.

3. Construction of the IBAQ (Inventory of Company Training Quality)[3]

In the next section, we describe the development of the eight scales of the "Inventory of Company Training Quality" (IBAQ), including the individual stages of item collation, item selection and initial piloting within the scope of a pre-test involving around 500 apprentices.

The IBAQ was developed within the framework of the research project "Influence of company-based training quality on the development of vocational competence in selected occupations" (cf. Dietzen, Tschöpe, and Velten, 2010).[4] The project aimed at identifying the main determinants influencing the development of vocational competences of apprentices at the learning venue of the company. To ask apprentices to provide an assessment of their company-based training conditions, the IBAQ was used to collect information on work-task design as well as social support and learning opportunities offered by colleagues and trainers. In addition, more objective learning outcomes like vocational knowledge and subjective personal outcomes like intrinsic motivation and vocational self-efficacy were measured in the project and related to the perceived learning conditions.

3.1 Item collation and selection

We began by conducting a literature review and collating relevant studies and instruments connected with the topics of *learning conditions, structuring work in a way that fosters competence or learning* and *training quality*. The above results and considerations were taken into

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3   For additional information on the construction of the IBAQ (German title: "Inventar zur betrieblichen Ausbildungsqualität") see Velten and Schnitzler (2012).

4   The research project was carried out by the Federal Institute for Vocational Education and Training in conjunction with the University of Stuttgart from 2010 to 2014 and used data collected in the four federal states of North Rhine–Westphalia, Baden–Württemberg, Hessen and Saxony. The sample consisted of apprentices in mechatronics and information technology occupations.

account for developing items in the ten areas of task variety, matching of requirements and skills, autonomy, meaningfulness of tasks within the company context, feedback processes, excessive demands, supportive personal and professional behaviour of colleagues and support and professional competence of the trainer.

For this, items from MIZEBA, the Brief Work Analysis Questionnaire (KFZA), the Questionnaire on Perception of Intensity and Scope of Action at Work (FIT) (Richter et al., 2000), the Salutogenetic Work Analysis (SALSA) and the questionnaire developed by Prenzel and colleagues (Prenzel, Kristen, Dengler, Ettle, and Beer, 1996; Prenzel, Drechsel, and Kramer, 1998) were considered. With regard to the development of items on training staff in areas such as professional and pedagogical suitability of teachers, we drew on findings relating to school research. Within the scope of the IBAQ, trainers are defined as persons who assume responsibility for the greatest part of training and provide professional guidance. In the reality of company-based training, this task, for example, may be realised by an experienced colleague rather than necessarily being conducted by a formal trainer (cf. Bahl in this volume).

Following the collation of items, identical or very similar components were removed. Formulation of the items was also standardised and adjusted to the language-use of young people. During the item-selection and adjustment process, both apprentices and VET researchers were involved in order to ensure comprehensibility and content relevance. All items were accorded a uniform six-stage response format ranging from 1 = "do not agree at all" to 6 = "agree completely".

3.2 Pre-test of the inventory and dimensionality testing

After item collection, a preliminary version containing 99 items was produced. In order to carry out an initial empirical investigation, the questionnaire was put to a pre-test involving a total of N = 503 apprentices from 27 classes at six schools in North Rhine-Westphalia (N = 137 for the training occupation of mechatronics fitter, N = 211 for information technology specialists and N = 155 for various commercial occupations).

In the course of the revision of the questionnaire, the first step was to eliminate those items from the inventory that had caused difficulties in terms of comprehensibility amongst many apprentices. Items exhibiting a highly oblique distribution and thus a low level of differentiability were also removed from the questionnaire. The revised version of the IBAQ encompasses 39 items.

In order to carry out an investigation of the scale structure of the inventory following its revision and abridgement, dimensionality tests were carried out based on a further sample via exploratory and confirmatory factor analyses. The sample used consisted of mechatronics apprentices in their second year of training taken from the research project mentioned above. Usually, mechatronics fitters work in industry and construct, maintain and repair mechanical and electronic components of complex mechatronic systems. Data collection took place in the period from February to April 2011. The following analyses are based on the fully completed questionnaires of N = 483 apprentices. Information regarding the gender of

the young people was not available; the proportion of female apprentices in this occupation is, however, low[5]. The average age of respondents was 20.38 (SD = 2.873). 127 participants (26.3%) stated that they held a higher education entrance qualification. 333 (69.1%) had an intermediate secondary educational qualification and 13 (2.7%) held a lower secondary school leaving certificate. These figures largely reflect the distribution of training entrants in this occupation in 2009 according to the vocational education and training statistics.

To analyse the dimensionality of the IBAQ we calculated factor analyses (main component analysis with varimax rotation) resulting in an interpretable solution with eight factors:

Table 1: The eight factors of the IBAQ

Factor	Example item (own translation)
Work tasks (task diversity; job demands and skills matching)	"I receive tasks which match my skills."
Meaningfulness	"My team relies on the results of my work."
Autonomy	"I have a say in the order in which I carry out my tasks."
Feedback	"My trainer holds regular feedback meetings with me."
Excessive demands	"At my company I have to do too many things at the same time."
Trainer's professional competence	"My trainer encourages me to find new solutions even if I make mistakes."
Trainer's considerate behaviour	"My trainer cares for my well-being."
Colleagues' support	"My colleagues explain to me what they are thinking when they deal with a problem."

All scales achieve good to very good reliabilities between $\alpha = .73$ and $\alpha = .89$. Except for the correlation between the scales *excessive demands* and *meaningfulness*, all scales share a certain amount of variance with one another. The reason for this could be that committed companies with motivated trainers are presumably more likely to assign varied tasks to the young people and to foster their competence development by providing regular feedback.

In a next step, applying confirmatory factor analyses we tried to confirm the eight-factor solution and investigated whether data could be better explained by a general factor. We compared the goodness of fit of three competing models. Model 1 assumes that the eight factors correlate with one another. The alternative assumption is that all item covariances are better explained via the adoption of a common factor (Model 3). This would imply that

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5   According to the vocational education and training statistics, the ratio for 2009 was 6% (Federal Institute for Vocational Education and Training, 2017).

answering the items of the IBAQ probably rather reflects the apprentices' general (dis)satisfaction with their working situation in the company.

Finally, Model 2 presents a "mixed model" which is also based on eight correlating factors that can, however, be integrated into a second-order factor at a higher level.

We tested the competing models using Mplus (Muthén & Muthén, 2010). Calculation of the path coefficients is based on covariances. Only full datasets are used for the calculations. Model accuracy is judged with the help of the chi-squared value, the degrees of freedom and the RMSEA value[6]. According to Hu and Bentler (1999), a quotient of the chi-squared value and the degrees of freedom < 3 indicates a good model fit. The RMSEA is deemed to be good if its value is < .05 and acceptable in the case of a value < .08.

Table 2 indicates the criteria for testing the three models.

Table 2: Goodness of fit criteria for the three models					
	χ^2	df	χ^2/df	p	RMSEA
1st model – eight correlating factors	1794.98	674	2.66	<.01	.059
2nd model – eight correlating factors and a second-order factor	1948.13	694	2.81	<.01	.061
3rd model – one general factor	5640.40	708	7.97	<.01	.120
Note. listwise deletion, N = 483					

Table 1 shows that Model 1 exhibits the best fit. The quotient of the chi-squared value and the degrees of freedom indicates a good match, and the RMSEA gives an acceptable fit.[7] The result of the confirmatory factor analysis indicates a model with eight correlating factors to explain the response pattern of the questionnaire that is presented with its standardised factor loadings in Figure 2. Obviously, the participating apprentices were able to differentiate between task characteristics and the interactions with their colleagues and trainers and the questionnaire does not merely reflect their general (dis)satisfaction.

To conclude, we succeeded in developing a new inventory differentiating eight key factors of the learning environment in in-company training. The next section addresses the inventory's validity, for which we will examine its empirical relationships with possible outcome variables.

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6   The chi-squared test is used to evaluate the deviation of the implicit model matrix from the observed covariance matrix. However, because this test reacts very sensitively to large sample sizes, the result may be that it becomes significant even in the case of small deviations. The Root Mean Square Error of Approximation (RMSEA) is a further parameter for judging correlation between the empirical model and the model theoretically expected.

7   Although the permitting of "cross loadings" of individual items to further factors, such as the item Feedback 5 "I receive regular written feedback on my work", to both the factor *feedback* and the factor *trainer's considerate behaviour* enables the chi-squared value to be reduced slightly, it remains statistically significant and the RMSEA decreases only marginally. For this reason, only distinct models are specified.

Figure 2: Structure and loadings of the IBAQ
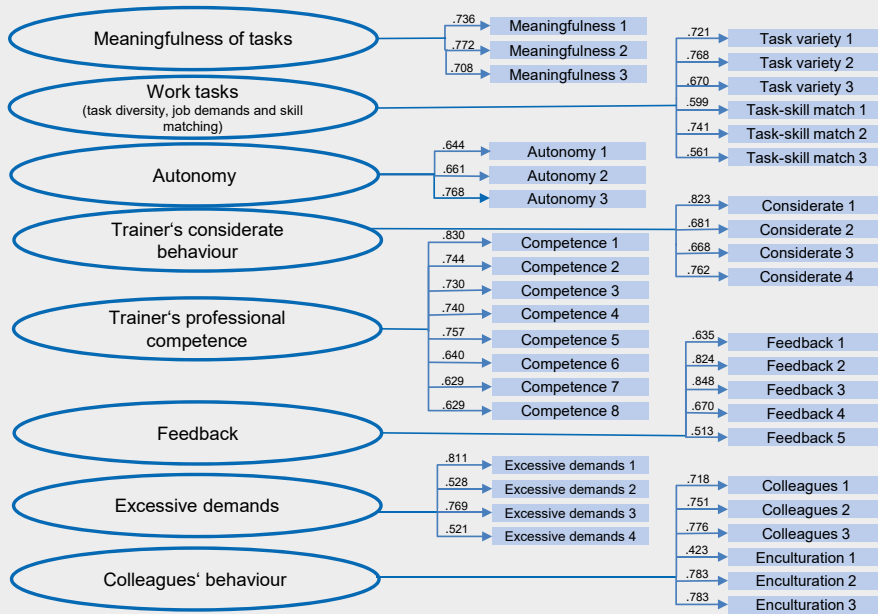
Note: N = 483, χ^2 = 1794.98, df = 674, RMSEA = .059, SRMR = .057, CFI = .874

4. Empirical analyses on predictive validity

To investigate whether a new inventory is useful to predict important outcome criteria, one has to examine its predictive validity. Usually, correlations are reported to document the amount of shared variance between the proposed scales and the outcome criteria. In this section, we present results regarding predictive validity of the IBAQ taking into account intrinsic or internal (we use this term interchangeably) motivation and vocational self-efficacy. Intrinsic work motivation and self-efficacy can be regarded as mediators between the learner's personality, the learning environment and competence development (Franke, 2005).

In their Job Characteristics model Hackman and Oldham incorporate internal motivation as a key work outcome (Hackman & Oldham, 1975). They comprehend individuals' internal motivation as the extent to which they are self-motivated to perform the job and experience positive feelings when working effectively on the job. Deci and Ryan also worked on the concept of self-motivated (they call it self-determined or intrinsically motivated) behaviour, especially learning behaviour. They pointed out that "intrinsically motivated behaviours are performed out of interest and thus require no specific contingencies – that is, no external or intrapsychic threats or promises" (Deci & Ryan, 2000, p. 77). Both definitions

are closely related, since behaviour that is pursued out of interest is usually associated with positive feelings. Deci and Ryan (2000) provide evidence proving that intrinsic motivation facilitates learning processes and thus is a central prerequisite for learning in VET. To capture intrinsic motivation we used a three-item scale adapted from Prenzel and colleagues (Prenzel et al., 1996; Prenzel et al., 1998). An example item is "When I learned something new in my training company, learning was really fun." (own translation). Its estimated reliability for the sample is $\alpha = .84$.

Self-efficacy is defined as "people's judgement of their capabilities to organise and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgements of what one can do with whatever skills one possesses" (Bandura, 1986, p. 391). According to Bandura (1986) self-efficacy is one of the most important aspects of one's self-concept mediating the relationship between knowledge and action. Therefore, self-efficacy plays a crucial role in VET. A feeling of self-efficacy can be developed through experiences of success and failure (Bandura, 1986), through experienced autonomy (Sousa, Coelho & Guillamon-Saorin, 2012), and is linked to job performance (Sadri & Robertson, 1993). A very low self-efficacy even predisposes to burn-out (Leiter, 1992). Self-efficacy can be conceptualised in a general or in a more domain specific way. In our study we used a six-item scale taken from Abele, Stief and Andrä (2000) to capture vocational self-efficacy (example item (own translation): "I am very relaxed regarding difficulties in my job as I can trust my capabilities."). Cronbach's Alpha is $\alpha = .77$.

To perform correlational analyses, another subsample of $N = 451$ mechatronics fitters in their first year of training is taken from the aforementioned research project. This occupation is male-dominated (in 2009 94 % of apprentices were male). On average the apprentices in the sample were aged 19.5 years (standard deviation 2.7 years). Two thirds stated that they had an intermediate secondary educational qualification, nearly thirty percent (28.8%) held a higher education entrance qualification and only 2 percent held a lower secondary school leaving certificate.

Table 3 shows the bivariate Pearson's correlations between the dimensions of the work environment and the two outcome criteria. As expected, all dimensions correlate moderately (Cohen, 1988) with intrinsic motivation. All correlations except for excessive demands are positive. Correlations with vocational self-efficacy are smaller. The strongest relationship is found for excessive demands. In contrast to expectations, meaningfulness and autonomy do not correlate with vocational self-efficacy. One reason for the stronger correlations with intrinsic motivation might be that enjoying one's work is more directly linked to the way one perceives the work environment. In contrast, vocational self-efficacy is less closely related to the perception of the work environment because there might be more intervening variables that mediate and moderate the relationship like personality traits (Grant, Fried & Juillerat, 2010), so that it may take more time for the effects of the work characteristics to unfold.

Table 3: Pearson's correlations between dimensions of learning environment and work outcomes		
Dimensions of the work environment	Intrinsic motivation	Vocational self-efficacy
Work tasks	.462**	.111*
Excessive demands	-.334**	-.304**
Autonomy	.343**	.069
Feedback	.346**	.156**
Meaningfulness	.343**	.072
Colleagues' support	.368**	.129**
Trainer's professional competence	.451**	.196**
Trainer's considerate behaviour	.453**	.109*

Note: N = 451, 2-tailed significance tests, ** significant at the .01-level * significant at the .05-level

In line with other research (Nikolova, Van Ruysseveldt, De Witte, and Syroit, 2014), in our inventory we differentiate task-based dimensions (*work tasks*, *excessive demands*, *autonomy*, *feedback*, *meaningfulness*) of the learning environment and interaction-based dimensions (*colleagues' support*, *trainer's professional competence* and *trainer's considerate behaviour*). To test our assumption that social interactions with colleagues and trainers play an important role in apprenticeships we calculate hierarchical multiple regressions for both criteria (see table 4). In a first step, all task-based dimensions are entered into the model. In a second step, those dimensions related to social interactions are added. As is shown at the bottom line, about 32 percent of the variance of intrinsic motivation can be explained by the five task-dimensions. For the prediction of vocational self-efficacy, only 9.5 percent of the variance can be explained. Adding the scales covering social interactions at the training company, an additional significant proportion of variance of 3.4 percent can be explained in intrinsic motivation and a nonsignificant proportion of .7 percent in self-efficacy.

We conclude that at least the apprentices' intrinsic motivation at the training company benefits from social interactions with their colleagues and trainers beyond task design. However, with regard to establishing vocational self-efficacy the incremental effect is quite small and does not reach significance level. In addition, the trainer's considerate behaviour even reveals a negative coefficient in the regression model. Presumably, considerate trainers run the risk of being overprotective and too careful when providing feedback, which might prevent apprentices from building vocational self-efficacy.

Step		Intrinsic Motivation		Vocational Self-Efficacy	
		β	β	β	β
1	Work tasks	.249**	.203**	−.023	−.055
	Excessive demands	−.230**	−.164**	−.293*	−.289**
	Autonomy	.137**	.090*	−.019	.004
	Feedback	.118**	.000	.101*	.117*
	Meaningfulness	.150**	.102*	.061	.051
2	Colleagues' support		.137**		.040
	Trainer's professional competence		.078		.129*
	Trainer's considerate behaviour		.153**		−.150*
R² adj.		.324	.358	.095	.102

Table 4: Hierarchical regressions for task-based and interaction-based dimensions on intrinsic motivation and vocational self-efficacy

Note: N = 451, 1-tailed significance tests, ** significant at the .01-level, * significant at the .05-level

5. Summary and outlook on further perspectives

The "Inventory of Company Training Quality" (IBAQ) presented here is an instrument that offers apprentices the opportunity to evaluate their learning environment at the training company. To develop the questionnaire we draw on various theoretical perspectives. Reference is made to the Job Characteristics Model (Hackman & Oldham) as "the dominant model of job design today" (Grant et al., 2010, p. 421). Nevertheless, we considered social interactions at the workplace with trainers and colleagues as well, and selected items that specifically capture favourable social learning and support processes. Other scholars also stress the relevance of social support and interdependence in their job design models (cf. Grant et al., 2010). In the IBAQ, particular emphasis is placed on the importance of trainers, who both bear responsibility for the imparting of training contents (cf. §28 BBiG, Federal Ministry of Education and Research, 2005) and for acting as agents of socialisation with the task of "addressing the problems which stand in the way of successful vocational education and training [...] and of communicating and networking with the individual young person in the company organisation" (Grimm-Vonken, Müller, and Schröter, 2011, p. 23).

Exploratory and confirmatory factor analyses revealed the eight factors of *work tasks*, *excessive demands*, *autonomy*, *feedback*, *meaningfulness*, *colleagues' support*, *trainer's professional competence* and *trainer's considerate behaviour* to be identified in respect of the learning conditions stated. Although these dimensions exhibit correlations, they are sufficiently differentiable from one another. Thus, apprentices are able to view their company training situation in a differentiated way and are not guided by a global assessment when responding to the questionnaire. All scales achieve good reliabilities between α = .73 and α = .89.

First empirical validation analyses document moderate relationships between the facets and intrinsic motivation and rather small associations with vocational self-efficacy. Both work-based dimensions and interaction-based dimensions of the learning environment can predict at least apprentices' intrinsic motivation. However, further investigations should address predictive power using longitudinal study designs. Furthermore, the integration of additional moderating variables like growth-need strength (the moderator proposed by Hackman & Oldham, 1975) or the role of individual proactivity (Grant et al., 2010) should be taken into account. Translating the IBAQ into different languages and validating it in an international (training) context is another issue to be addressed. Since the inventory is not only applicable to initial VET contexts, deploying it in other work-based learning settings would be feasible, too[8].

The IBAQ is also suitable for use as an evaluation instrument for training practice providing a basis for communication of and reflection upon the company-based training system between apprentices and trainers or supervisors.

To sum up, we propose the new Inventory of Company Training Quality (IBAQ) contributing to assessing relevant dimensions of the learning environment in VET training companies. The eight scales address task-based as well as interaction-based facets of the training environment that are indispensable for successful learning, and are predictive for intrinsic motivation and to a smaller extent for vocational self-efficacy.

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8   International researchers interested in using the IBAQ in international learning contexts are kindly asked to contact the authors.

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Part III:
Curriculum Development for
Work-based Learning Schemes

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▶ Striving for Competence: China's Way of Work-based Learning Curriculum Development for VET Institutions

1. Introduction

In spite of China's long tradition of handicraft, its productive sector has not given rise to the birth of an institutionalised vocational education and training (VET) approach like in Germany or other countries with a strong tradition in work-based learning (WBL). The Chinese VET system gradually evolved along the establishment of modern vocational schools during the Self-Strengthening Movement (*yang wu yun dong*, 1861–1894). Today, the predominant element of China's VET system is school-based education, and the learning contents are derived from academic disciplinary knowledge, e.g. specialised theory related to an occupation and knowledge of general education like mathematics, Chinese etc. Although VET institutions (vocational schools and colleges) also began to pay attention to the training of operational skills, e.g. the applicability of learning outcomes to work, which aims to meet the job requirement rather than the cognitive competence as well as the personal development of learners, this type of education can hardly meet the purpose of vocational education fundamentally, namely "learning how to work". Over the past twenty years, promoting the development of a training mode combining theory and practice, enterprise and school, i.e. work-based learning Chinese style, with a curriculum concept based on job analysis and working processes, has gradually become a consensus.

2. Conventional VET curriculum

The traditional curriculum of Chinese VET institutions is composed of two relatively independent didactic parts, i.e. theory courses and operational technical skill training. Coordination between the content and time plan of these two parts is not pursued, or cannot be pursued due to organisational difficulties. The theory courses are usually categorised into general courses, basic specialised courses and specialised courses, which explains why it is

called a "three-stage curriculum" (*san duan shi*). This type of curriculum has a dominant character of "theory and practice in parallel", which reflects the idea of the "parallel curriculum" advanced by the American educator Foshay (1968), whereby students are expected to explore and solve practical problems in reality at work while acquiring systemic knowledge.

Until now, the "parallel curriculum" has played a main role in Chinese VET practices. Identifying the training contents here relies mainly upon transformation of the discipline-specific knowledge generated from science and technology. The content of teaching is knowledge, with "fact" and "symbol" as the main forms of presentation without any direct connection with the world of work. Practical teaching emphasises operational skills but without incorporating learning in work situations and the work process. Schön criticises this concept of deriving applied knowledge from science: "This concept of applications leads to a view of professional knowledge as a hierarchy in which general principles occupy the highest level and concrete problem solving the lowest (Schön, 1983, p. 24).

This kind of "parallel curriculum" can guarantee the logical and systematic nature of the scientific discipline to some extent, but fails to relate to working life. It faces the following problems which are difficult to solve:

▶ The teaching focuses on the transmission of knowledge and the training of skills while neglecting the values of action learning. Without treating "work" as an entity, a holistic understanding and reflection of work cannot be developed, so that eventually the highest level of professional cognitive competence cannot be achieved.

▶ In practice, due to the lack of equipment, facilities and organisational conditions, vocational schools and colleges usually focus on theoretical knowledge acquisition or they fail to conduct in-depth work practice, thus neglecting the acquisition of experience.

▶ Under the current student admission mechanism, most of the VET students are those who are left behind due to low scores in university admission examinations and high school admission examinations. They are not usually good at the deductive learning approaches based on abstract thinking; they have extreme difficulty in deriving theoretical learning from the work situation and are unable to realise the knowledge transfer.

Thus, it is difficult to meet the requirements of competence development and to achieve the educational ideal of "self-realisation" of the parallel curriculum proposed by Foshay through the institutional form of "parallel curriculum".

Despite the problems, this curriculum is still widely applied in China, probably for two main reasons: on the one hand, the organisers, implementers and researchers of Chinese VET have mostly been trained under the traditional knowledge-based (vocational) educational system and have little understanding of the real situations in enterprises; on the other hand, "applied knowledge" is a widely accepted concept; VET teachers do not have enough knowledge and sensitivity to understand the difference between "applied knowledge" and the knowledge in use.

Curriculum development is a process of adapting the curriculum to social, economic and technological development needs by means of necessary review and improvement. Since the beginning of this century, China's VET has focused increasingly on solving outstanding problems with regard to training quality, especially the problem that the classical training programme setting, the curriculum development and the arrangement of didactic processes are no longer meeting the demand. The Ministry of Education (MoE) and the Ministry of Human Resource and Social Security (MoHRSS) issued many policies for improving the quality of the curriculum, and launched a number of projects to establish key VET institutions. The education model that promotes cooperation between enterprises and schools has become widely accepted. It is of great significance in these measures to institute a better balance between theory and practice at the curriculum level to cater for the trend in demand for work-based learning.

3. The curriculum based on job and occupation analysis

In order to improve the quality of the VET curriculum, foreign approaches to curriculum development based on job and occupation analysis have been introduced in China through a number of international projects with Canada, Germany, the World Bank and other donors since the beginning of the 1990s, especially the CBE (Competence Based Education) approach, the DACUM (Developing a Curriculum) curriculum development method, and curricula used in the dual training system in Germany. These approaches and curriculum modes are imprecisely known as the "CBE mode", "DACUM mode", and the "Dual system mode" in the Chinese language, and their application has massively improved the VET curriculum's relevance to practice and its effectiveness.

3.1 The curriculum with "Theory in the Service of Practice" (TSP)

The education and training ideology and concept of the Competence-Based Education (CBE)[1] that originated in North America have been widely applied in China. During the popularisation of the CBE concept, many VET institutions implemented the DACUM method, i.e. programmed qualification research with the critical element of job and occupational analysis. According to the argument of Norton, "expert workers can describe and define their job/occupation more accurately than anyone else" (Norton, 1997, p. 1). DACUM decomposes a particular occupation/job into relatively independent duties, each of which is then broken down into several tasks and corresponding skills. Objective deduction from the subjective judgment of expert workers then leads to "objective" courses.

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1   CBE is an instructional programme that derives its content from verified tasks and bases assessment on student performance. Programmes of this type are also sometimes called performance-based education (PBE) and performance-based training (Norton, 1997, Appendix C, p. 1).

Starting from the job requirements, CBE/DACUM has regarded knowledge-based learning as the supporting measure for the acquisition of skills and competence development without requirements concerning the quantity and systematisation of knowledge, thus forming the curriculum type known as "theory in the service of practice" (TSP). The widespread slogan "Theoretical knowledge should be adequate for application" in China is a vivid portrayal of the pursuit of such curriculum.

Practice has shown that the CBE/DACUM approach, which takes job analysis as a starting point and focuses on the requirements of the labour market, has almost a "revolutionary" significance, compared to the academic paradigm of the past, based on disciplinary knowledge, because the idea of "theory in service of practice" is contradictory to the traditional precept of Confucian culture that "knowledge accumulation is superior to practice". It has fundamentally changed the relationship between theory and practice and thereby determined the new position that "practice is more important than theory" in VET. It has also, indirectly, given an impetus to the Chinese government while shifting its focus from the ideological conflict in the so-called "culture revolution" towards "economic development".

In the discussion among education scientists in China and in several European countries, the TSP Curriculum has often been criticised especially for ignoring pedagogical aspects and "educational goals" (Jiang & Wu, 2006; He, 2016; Buch & Frieling, 2004; Ertl & Sloane, 2006; Rauner, 2017). The basic assumption of this concept is that practical knowledge as it appears in professional work is interpreted as being applied scientific knowledge, while the impacts of tacit knowledge on professional competence development are neglected. It regards learning as a simple process between input and output, and competence development as a top-down transfer from teacher to student, emphasises the enhancement of qualification achieved through the accumulation of scientific knowledge and skills, and focuses on observable changes in behaviour, which is directly related to the Behavioural Learning paradigm (Hager, 1995). Insufficient attention was paid to professional cognitive competence. The notion of combining single skills into a competence also ignores the learning situation (Lave & Wenger, 1991) and holistic qualities of work.

Opposed to the widely held belief in the West that China is a society with centralised planning and decision-making processes, VET institutions enjoy a high degree of curricular autonomy[2], especially in the case of new training programmes for which no official curriculum yet exists. A number of VET institutions where the Anglo-Saxon culture has more influence use the DACUM. Practice shows, however, that they struggle to provide courses on a sufficiently empirical basis, because there is no established didactic tool for handling identified work tasks in a systematic manner. Instead, the existing curriculum framework was applied, which leads to the establishment of courses that are largely based on the scientific and engineering disciplines. The difference between this curriculum and the academic curriculum

2   Although the Ministry of Human Resources and Social Security has developed an Occupational Classification, the description of the occupation does not provide enough information to derive appropriate training courses.

of higher education is vague. Deng conducted an analysis on the curricula of this type. After comparing vocational college curricula with undergraduate courses of universities, she came to the following results: out of the 16 courses for the Communication Technology major of the vocational college, eight courses are exactly the same as those of the university undergraduate programme, while six are basically the same, resulting in 87.5% of overlapping courses (Deng, 2004).

3.2 The curriculum with "Integration of Theory and Practice" (ITP)

The development of information and communication technology (ICT) and the popularisation of new forms of work organisation bring forth higher requirements for the professional competence of skilled workers. Since the end of the last century, both educationalists and VET institutions have recognised that effective learning requires students' cognition and reflection with respect to the tasks, processes and contexts in real work situations. It is necessary to carry out an integrated curriculum designed to allow students not only to acquire knowledge and skills, but also to gain holistic action competence and an occupational identity. At the political level, in 2003 the Ministry of Education launched a pilot programme to "Improve the Education Quality to Deal with the Shortage of Skilled Personnel" by developing a new curriculum emphasising the integration of knowledge learning, skills training and experience acquisition in actual work situations (MoE, 2004). From that time on, VET institutions have done numerous experiments in the area of developing "integrated curriculum between theory and practice" (ITP curriculum). These experiments can be categorised into two types. One simplified type is that project teaching has been promoted as a kind of curriculum model (Xu, 2009) and has been implemented in Shanghai and the immediate vicinity of Shanghai; the other is the introduction of the learning field curriculum initiated in Germany.

In Germany, vocational schools started to implement the didactic concept of "learning fields" (topic areas) in 1996. A learning field is a specialised teaching unit derived from professional competence in the form of an "action field" by means of instructional design (KMK, 1996; Bauer & Pzgodda, 2003, p. 24). Chinese educationalists believe that high-qualified skilled workers shall meet the requirements of professional competence, while the purpose of learning fields is to promote the development of professional competence that is mentioned as individuals' reflection in an occupation and in society, and the willingness and capability responsible for the shaping of individuals and society. Thus, the learning field approach should be an optimal type of ITP curriculum that is characterised by "learning situation orientation" and "work process systematic" (Jiang & Wu, 2006).

In the last ten years, VET institutions have carried out a great number of pilot projects to develop Chinese "learning fields", whose features are highlighted as follows: the training objective is to develop holistic comprehensive professional competence; the learning content is the professional task (which does not correspond to discipline knowledge); the learning process is aligned with the work process, where students can conduct learning and thinking in comprehensive actions (Zhao, 2009).

Developing an ITP curriculum requires an occupational analysis method that describes characteristics of modern occupations properly and reflects the rules of competence development. The method of "professional task analysis" (or "BAG" from the German "*Berufliche Aufgaben*") could be regarded as a further development of DACUM (Röben, 2008, p. 754). In comparison to the DACUM approach, BAG identify the "professional tasks" on the theoretical basis of the "developmental logic curricula" (Rauner, 1999) and the "expert-novice paradigm" (Dreyfus & Dreyfus, 1986) by introducing a new "Expert Skilled Worker Workshop" (EXWOWO). In contrast to DACUM's expert workshops, EXWOWO regards "work" as a whole process and distinguishes, filters, analyses and classifies work tasks into different career development stages (Spöttl, 2008; Spöttl in this volume). The result of the occupation analysis is not a list of competencies, but a number of professional tasks, so as to facilitate the specification of comprehensive learning objectives and learning content. Chinese VET institutions have carried out a wide range of practices on BAG, and have refined and improved the approach according to the Chinese-specific situation. Different workshop procedures and standards are defined for different types of occupations, particularly to reflect the requirements for the acquisition of work experience and tacit knowledge. It can be said that the BAG approach has helped Chinese VET to realise the transition from the discipline-oriented to a developmental-logic-based and professional-competence-oriented curriculum.

In the relevant practices, ITP curriculum has been divided into two developing levels: the lower level is "the integration of theory and practice teaching", while the higher level is "the integration of work and learning" (*gong xue jie he yi ti hua*). In institutions where teaching facilities and equipment are lacking and teachers have little practical experience, an integrated didactic unit of theory explanation and skill training is conducted in one class, which means one step forward as regards the separation of theory and practice. When faculty and organisation conditions permit, the learning content of the "integration of work and learning" curriculum focuses on all work-process-related factors including the subject matter of professional work, the tools, methods and organisation of skilled work, and the requirements for skilled work.

From the pedagogical-didactic point of view, the introduction of an ITP curriculum has played a positive role. The ITP curriculum built a new curricular system according to the competence developmental logic after breaking the discipline-oriented curricular system. This curriculum can better help students to understand the connection between knowledge and work, to obtain the work-process knowledge and context awareness. It has also had an education policy impact. For example, in 2014 the Ministry of Education published the "Decision of the State Council on Accelerating the Development of Modern Vocational Education" (Guo Fa [2014], No. 19), which clearly promoted the spreading of "the work-process-oriented teaching model" (MoE, 2014). The Ministry of Human Resources and Social Security formulated a "Guide for the Formulation of National Skilled Talent Training Standards (interim)", which not only uses the professional task analysis method but also defines a number of key elements for the ITP curriculum (MoHRSS, 2013).

Empirical research shows that the ITP curriculum developed with BAG has achieved positive results. With random selection of similar conditions including students, learning venues and equipment, students in the experimental group following the ITP curriculum generally demonstrate better professional competence than the ordinary group. According to the results of COMET competence diagnostics[3], the experimental group particularly outperforms the ordinary group on the second level of conceptual-processual competence, i.e. "business and work-process orientation", and the third level of holistic shaping competence, i.e. "creativity of solution", confirming that the ITP curriculum is a good way to develop students' comprehensive professional competence (Zhao, Lin & Zhang, 2014).

The implementation of the ITP curriculum implies a series of changes, and poses a great challenge ahead for the current school management system (e.g. class arrangement, independent theory teaching and practical training). Reforms need to be aware of the following prerequisites:

▶ Great changes are needed to commonly held beliefs about teaching and learning and the management and service concepts of VET institutions. The relevant personnel need to change their mindsets so as to align their actions with the new curriculum concepts.

▶ Costs for curriculum development, teaching operation and management will greatly increase.

▶ The new curriculum requires teachers to have comprehensive competence both in teaching and occupational experience.

The ITP curriculum has, up to now, barely been applied in developed regions and VET institutions with advanced educational ideas. There are still many challenges. In some pilot projects, the curriculum reform tends to show a "formal, superficial and conceptual" trend. He's survey (He, 2016, p. 145) found that under influence of the previous DACUM concept, many VET institutions regard professional competence as a punctate training output of skills, thus reducing the legitimacy of the "holistic professional-competence-oriented" curriculum. In accordance with the e-learning idea of "micro-courses" (*wei ke*), teaching units of knowledge and skills are sometimes reconfigured into smaller-scale and standard programmes, which hinder students from obtaining a comprehensive understanding of a work process. The current occupational certification examination and learning evaluation contradicts the work-process-oriented curriculum concept, and also affects the implementation of the new curriculum.

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3   COMET is a scheme of large-scale diagnostics of professional competence developed by an international research team from Germany, China, South Africa and other countries led by F. Rauner of the University of Bremen, Germany. It has established a cross-occupation professional competence model comprising three dimensions, e.g. functional, conceptual-processual and holistic-shaping dimensions of competence (Rauner et al., 2012).

When developing a curriculum that integrates work and study, the essential task is to analyse professional work as an integrated subjective and objective action (Frieling, 1995; Rauner, 2000; Fischer & Rauner, 2002; Gagnon & Collay, 2006). This requires quality monitoring of the methods used, including sector and occupational analysis, task analysis, curriculum design, curriculum implementation as well as evaluation and assessment. It puts forward two requirements: firstly, the occupational analysis needs to pay attention to harmonising the relationship between "technological development", "professional task" and "vocational education"; secondly, it is necessary to ensure that the curriculum is open and the learning content can be further developed so as to meet the changing demands of technology and society.

4. Results and prospects

At present, the practice of qualification research within curriculum development for VET in China can be divided into two categories: the sector analyses organised by governmental authorities, and the job analysis adopted by VET institutions. In many cases, these activities remain a simple process of data collection and processing. For example, the Ministry of Education is working on developing "Teaching Standards" (*jiao xue biao zhun*) for vocational colleges in an effort that is mainly based on the colleges' involvement. Colleges are called and organised to do enterprise investigation, but corresponding regulation and guidance is not available on what kind of methods to use and how to interpret the gathered data. There is also no appropriate tool that ensures the reliability of the analysis of the work structure and content during the professional task analysis. Without enough preparation in the basic understanding and methods of qualification research, it is difficult to guarantee the quality of the surveys.

The lack of sensitivity to use established research methods may increase the uncertainty of the results of curriculum development. It is of great significance to develop a nationwide "guide book" on conducting qualification research, and to monitor the process of curriculum development. In other words, a whole "toolkit" is necessary for curriculum development, which covers the entire procedure including sector analysis, occupation and job analysis, curriculum design and assessment. This guide book should be able to help VET institutions to achieve the following objectives: to identify professional tasks and to develop curricula that are conducive to the competence development logic of learners and in line with the national occupational certificate standards; and to allow for authorities to achieve easy and effective control over curriculum development and the implementation quality of VET institutions.

The key problem to be solved is how to effectively identify the courses and learning contents from the results of qualification research. A clever way forward for developing countries is to study the experience from developed countries and to localise the best practices for general promotion. The origins of curriculum research in different developed countries are different. In the United States, there are at least three research areas that have had a significant impact on VET curriculum research, e.g. general (school education) curriculum

theory; curriculum research and development practice with DACUM from human resources management; and expertise research. Interestingly, the interaction between the three is not very clear. For example, the rich curriculum theory (Bobbitt, 1918; Hass, 1987; Ellis, 2004) did not lead to in-depth discussion in VET, while the high level of expertise research (Ryle, 1949; Benner, 1984; Dreyfus & Dreyfus, 1986) had a limited impact on the VET curriculum. VET curriculum development and research in Germany is mainly carried out in the framework of vocational didactic theory and vocational discipline research with extensive research outcomes. However, due to language barriers, the impact of these studies on other countries is still limited. Looking at the actual outcome in developing countries like China, experiential learning from developed countries in this regard brings "two-sided" impacts. On the one hand, researchers have gained much inspiration as well as tools to achieve effective results in a short time; on the other hand, different countries have varying concepts, which could cause confusion for practitioners (with a weak theoretical base). For example, the Anglo-Saxon world and Germany have different understandings of "competence". As a result, their curriculum concepts and development methodologies are also different: the former regards skilled workers as a resource that needs effective allocation, while the latter focuses on the development of domain-specific cognitive dispositions. It is nearly impossible to carry out effective cooperation in curriculum research and practice between VET institutions that follow concepts which differ across these lines, which could adversely affect developing countries in their efforts to improve curriculum and practice without a strong theoretical basis.

The advent of the Internet era has promoted the development of the world of work and education. On the one hand, ICT imposes higher requirements upon employees' key competencies, many of which can only be gained in the work process; on the other hand, artificial intelligence based on the Cyber-Physical System (CPS) is being extended to the entire working environment, which gives birth to the highly flexible, personalised and digital learning mode. The workplace returns to being an important place of learning. Although the features of VET curricula in the Internet era have not been fully grasped, one certainty is that WBL will become as important as traditional classroom-based learning, and that both are indispensable parts of any VET curriculum.

Currently, there is still an inadequate understanding of the potential of WBL in China, probably because of two reasons: the first relates to the limitations of work-based learning itself, namely the fact that WBL depends heavily on the specific tasks and working conditions, that the learning process is relatively casual, and that it costs much more. Furthermore, some workplaces are off limits for learning (the assembly line, for instance). Secondly, the related research is scattered across different disciplines, such as vocational pedagogy or industrial sociology, under different concepts and understandings about the shaping of the learning process. In the future, the focus of VET curriculum research in China should be on how to design WBL tasks for cross-occupational areas supported by ICT, so as to ensure that learners become the main body of the learning process. The key points could be derived in terms of how to transfer a complex work reality into a learning situation with the help of ICT. It is also

important to define the paradigm of teaching and learning via simulation and the learning platform, and to determine the knowledge elements and learning communication mode contained in this platform.

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Georg Spöttl and Gert Loose

▶ Conducting Work-process Analyses for the Development of Advanced Detailed Curricula

1. Introduction

This article focuses on the development of curricula that are oriented towards work-processes. This approach is based on insights which were generated from a number of projects in Europe and Asia. From a conceptional point of view, sufficient progress has been made to enable the authors to develop curricular structures based on work-processes with due regard for a variety of contexts and with reference to different levels of workmanship. This has been taken up on the one hand to position vocational training as a response to the requirements of work-processes and on the other hand to make sure that the competences for cooperating in such work-processes will be available. In this process it is important that with regard to work processes, the social implications of work need to be given an important role in relation to each specific cultural context.

2. Establishing a platform for the development of state-of-the-art detailed occupational curricula

2.1 Ensuring the relevance of curricula in TVET

We can no longer pursue the idea of acquiring skills that will last for a lifetime. Steadily increasing complexity and rapid technological change in the workplace create a need for competences that respond to changing and as yet unforeseeable requirements. Consequently, we can no longer rely on an analysis of only those competences needed in the workplace today, and then use that analysis as the basis for designing the curriculum and training programme. Instead, we need a change of paradigm (Boreham & Fischer, 2009). We need to understand the dynamics which occur in the workplace as they are reflected in changing work-processes. Hence, the common platform for skills training which has been established

by competence-based standards such as the NVQs (National Vocational Qualifications) in many countries has to be upgraded to meet the demands of increasing complexity in the work place and rapid technological change.

These challenges urge us to reach beyond this common platform into the work-processes themselves and to create a curriculum that can cope with today's uncertainty in the work place. Therefore, it is not enough to capture duties and tasks at the work place – as has been the central concern of the DACUM ("Developing a curriculum") approach (Norton, 1997). The main focus of this approach is task oriented, but tasks do not include all the implications of work that are relevant for advanced curricula. Instead, we need to go into the work-process and conduct a "work-process analysis"[1] to identify all competences that are required within the overall work procedure. This in turn leads to the further question of how educational content and vocational knowledge could be related to the students' needs and the process of competence development.

Curriculum development faces the great challenge of identifying educational content, vocational knowledge, and vocational capability (i.e. students' needs) such as intellectual understanding, values, verbalised concepts, motor skills and physical issues. This is due to the fact that vocational knowledge and capabilities are content-related and holistic. Traditional methods of curriculum development (such as "didactical reduction", "functional analyses" etc.) cannot meet these requirements. They ignore the holistic, situational and work-process related quality of work (Lave & Wenger, 1991; Spöttl & Loose, 2014; Hiim, 2017).

Nowadays, curricula are needed in which the guiding structure is provided by authentic working practices, the requirements of the work-process and the work-process itself. For successful learning, we first need to progress beyond "narrow" skills to acquire "broad" competences which enable the learner to cope with uncertainty and change in the workplace; secondly, we need to identify and to convey the domain-specific skills that are basic to what we call a "core work-process"[2] in a particular occupation; and thirdly, we need to identify the work-process knowledge behind the work-processes under study. The work-process knowledge encompasses the theory that is needed to perform competently in a work process, which includes aesthetic, moral, societal and technological aspects (Spöttl & Loose, 2015, p. 31; Spöttl 2016).

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1   A work-process analysis (Kruse, 1986, p. 189) is an on-site survey of skilled work. It identifies the knowledge, skills and competences for mastering the execution, and the shaping, of occupational work tasks. In order to gain insights regarding competence-development of individuals, the framework of work-process analyses focuses on the survey of processes, embedded challenging situations, tasks and problems occurring during work; and above all on how they are coped with. Within the framework of work-process analyses, the coherence of work and the tacit knowledge and skills are revealed. Thus the context for competence-development and for the application of occupational knowledge is determined.

2   Core work processes are usually formed around specific skills and may constitute a complex arrangement of related skills. Typically core work processes form a skill set such as "manually fabricating a joint" as in "carpentry". Core work processes always integrate components or systems of a "product" or a "service" under a work perspective. This leads to a "structure of work" instead of a "structure of technology". The "structure of work" is the basis for the competence model.

This article gives an overview of the necessary steps from planning a work-process analysis to the development of Advanced Detailed Curricula (ADCs), as we call them. An approach will be outlined which can meet these challenges (Spöttl & Tutlys, 2017). It will then be demonstrated how "core work-processes" can be identified with the help of work-process analyses and subsequently used as a basis for curriculum development (Spöttl, Loose & Becker, 2017). Ways will be shown of shaping the core work-process structure in order to guarantee work-process based curricula. The guidelines are based on empirical surveys conducted in different sectors of industry in a number of European countries (recycling sector; automotive sector), in Malaysia (manufacturing sector), and in Oman (12 sectors) (Spöttl, 2008, p. 169).

2.2 Work–process based qualification research as a basis for curriculum development

2.2.1 Approaches of qualification research

Traditional occupational profiles and standards for most economic sectors are structured in many countries by following the subject background involved. This systematic does not take into account the increasing importance of the changes taking place in work-processes in the context of the Fourth Industrial Revolution and the requirements of work as such (Schwab, 2017; Lee, 2013).

For effective identification of requirements for today's work and its complexity, it is necessary to involve research approaches which grant access to work, work processes, changes of work and the related implications. The results provide the essence of conclusions with regard to the need for qualifications, occupational profiles, the shaping of curricula and consequences for learning processes.

In this process it is of special relevance for vocational education and training to establish linkages with social structures of work and competence development so that society can participate in co-shaping the objectives of education. This has to be closely interlinked with competence development for the performance of occupational tasks and work-processes.

One of the main tasks in this context is the selection of a research approach that is sophisticated enough to be used to identify the implications of work and work-processes relevant for curriculum development. The selection of an adequate approach depends on the objectives of curricula in the context of vocational education. In the present case, the "term of curricular structure in the sense of a curricula theory is understood as construction alignment and interior interrelationship of curriculum elements according to certain principles which shape curricula" (Reetz & Seyd, 1995, p. 204). But curricula have to be translated into practice – and have to be open to critical scrutiny (Stenhous, 1975) while supporting the shaping of competence. In our specific approach, the objectives of the curriculum are oriented towards the concept of core work-processes and towards the procedures of evaluation and assessment (Scott, 2008). This understanding of curriculum development can be combined with different procedures, such as participative approaches (Kircheldorff, 2006), which have been described in more detail by Spöttl (2009b, p. 1630).

The procedure sketched above requires the selection of corresponding research approaches. Priority should be given to the vocational educational, scientific approach to qualification research, which is based on the perspective that curriculum research and curriculum development and/or curriculum design must aim to safeguard subject development and evolution. However, this cannot be guaranteed without the foundation of an empirically secured assessment of the concrete capacities needed by society, which are the result of complex configurations, based on technological, economic, legal, and social developments (Spöttl, 2009b, p. 1629).

Direct involvement of the target group for curricular decisions – i.e. the skilled workers and key persons of the companies – is essential. These persons have to be actively involved in supporting the analyses of skilled work, and of the incorporated practical know-how and skills, throughout the identification of work-processes. As well as being part of the development process, they thereby legitimise the results of the analyses. At the same time, the ranking and the relevance of the findings are evaluated in expert/skilled-worker workshops by creating an expert pool of skilled workers, representatives of companies, curriculum developers and teachers.

2.2.2 Work–process based curriculum development

In traditional curriculum design (e. g. subject based curricula), requirements of an occupation as a whole (for example the maintenance of a car as an entity) are hardly ever the subject of vocational training. This is not only due to the fact that the skilled trades are specialized either regarding the mechanic or the electronic systems of a car or even regarding other components such as the engine, brakes or bodywork. This subject-systematic, technology-centred curriculum design, which focuses on the systematisation of the particular subject is burdened with the following shortcomings:

- ▶ The content is largely divergent from the work-process.

- ▶ Separation of the basic training from the work-process leads to motivational problems among the trainees.

- ▶ The curricula are overloaded with topics and subjects which are not practice oriented (Spöttl, 2009a, p. 76).

The subjects at all levels of differentiation are designed in a work-process oriented way. Work-processes are analysed by, and structured by the outcomes of expert interviews. The core work-processes have to be structured according to a concept which enables a beginner to develop into an expert. Based on the actual competences for work involving high-technology and society, the competence development model described here is aimed at qualitative reorganisation, moving on from a philosophy of "regulation-guided know-that" towards "experience-based know-how" (Dreyfus & Dreyfus, 1986, p. 41; Ryle, 1949).

Following this approach, the core question is which contents should find their way into vocational education and training and how they should be structured. Contents with a special relevance for curricula are deep work interrelationships which have to be identified with the help of work-process based research. Such contents are the basis for conceiving complex learn-and-work arrangements for the qualification of employees for occupational action fields. Numerous curriculum approaches reveal a work orientation. This is, however, not the only performance index for a good curriculum (Spöttl, 2009b, p. 1634).

In order to ensure the proper work orientation of the curricula, work-process analyses have to follow scientific structures in vocational education which concentrate on the identification of work interrelationships and the competence dimensions of skilled workers. Work processes thereby pursue the following three aims:

(1) to identify the *competences* for the managing and shaping of occupational work tasks;
(2) to access the most important coherences for *competence development*;
(3) to determine the *work-process knowledge* for the shaping of business and work-processes.

With their three categories of objectives, i.e. *competence, competence development* and *work-process knowledge*, these objectives reflect supplementary principles for determining the contents of curricula. Reetz & Seyd concluded that this leads to three different curriculum structures and approaches (science principle, personality principle and situation principle; Reetz & Seyd, 1983, 1995). Work-process analyses have to take into consideration all three principles (Spöttl, 2009b, p. 1634). The target is to offer a bottom-up approach for curriculum development.

Each of these three skilled work-related dimensions of work and learning correlate with one another. In this way the demands for skilled work and for technology are reflected in the object of the skilled work and also in its methods, tools and its organisation.

3. Developing advanced detailed curricula – guideline

3.1 Conducting work-process analyses

The steps will now be described which have to be taken in order to define the domain-specific skills and the broad competences that are required for successful performance in high-tech occupations. To this end, work-process analyses should be conducted and used to establish "Advanced Occupational Standards" (AOSs). Advanced Occupational Standards are different from "regular" occupational standards in the sense that they attempt to portray broad competences, which are needed for performance in "dynamic" (changing) work-processes, while the "regular" occupational standards rather focus on ("static") tasks which are observed and the skills which are needed in response to these tasks.

However, we must first be sure about the context in which we place these analyses. We focus on competence development through skilled work as learning to act autonomously and

professionally with regard to all skill requirements within an occupation or an occupationally meaningful area of activity (e.g. repairing a car, manufacturing the timber roof structure of a house, or engaging in recycling) (cf. Spöttl & Becker, 2008). The first two activities refer to skilled occupations while the last activity at least refers to exhibiting a "skilful", professionally optimised approach regarding the work performed.

The conducting of work-process analyses holds the key to establishing AOSs which themselves contain the basis for designing effective state-of-the-art training programmes and related curricula.

If we can define a reliable method of conducting these analyses and establishing the standards, we will be able to unfold the essence of acquiring the competences that are needed in the workplace today. Consequently, we can state that we need to conduct work-process analyses to generate an insight into these competences. When conducting these analyses, our threefold concern goes beyond the identification of routine skills – such as using a screwdriver to fasten screws:

First we need to identify "broad" competences which enable the learner to cope with increasing complexity and rapid change in the workplace – such as interpreting the results of the fault diagnosis of the latest generation of engine-management systems in a car; *secondly,* we need to identify and to convey the domain-specific skills that are basic to what we call a "core work process" in a particular occupation. An example of such a core work process and the corresponding domain-specific skills would be "polishing" for the domain (occupation) of "carpentry"; and *thirdly,* we need to identify the work-process knowledge behind the work-processes under study. The work-process knowledge encompasses the theory that is needed to perform competently in a work-process which includes aesthetic, moral, societal and technological aspects.

According to our experience, roughly eight to twelve "core work-processes" constitute a skilled occupation, and we need to go deep into the actual work-process in order to identify the broad competences which are needed for the required flexibility at the place of work and the core elements which are domain-specific. The technique (approach) of identifying the broad competences together with the domain-specific skills needed in an occupation has already been mentioned above. We call it a "work-process analysis". It is the cornerstone for establishing AOSs which are themselves indispensable as the foundation for developing state-of- the-art occupational curricula.

Consequently, conducting a series of on-site work-process analyses is an indispensable part of developing AOSs. It is the core of the development process, which leads to effective detailed curricula and it therefore requires careful consideration. A work-process analysis always has to collect all details of how to cope in a work-process and therefore has to be an on-site analysis. It can in no way be replaced by expert opinion in a round-table setting.

For a presentation of the structure which demonstrates how the work-process analyses are embedded as the core of the overall development process, see Figure 1.

3.2 The steps of conducting work-process analyses and establishing advanced occupational standards

Figure 1: Graphic outline of a step-by-step plan for proceeding from work-process analyses to Advanced Detailed Curricula

Graphic Outline of a Step by Step Plan for Proceeding from Work-Process Analyses to Advanced Detailed Curricula and Advanced Skill Testing	
1. Preliminary Activities	**1.1. Sector Analysis and Developing a Draft Profile of the Training Occupation/Activity**
	1.2. Locating the Training Occupation/Activity in a Cluster Based Occupational Grid
	1.3. Selecting 5 to 8 Relevant Companies for the Work-Process Analyses
2. Conducting the Work-Process Analyses	**2.1. Observing the Skilled Workers at their Work**
	2.2. Conducting Work-Guided Professional Interviews
3. Documenting the Analysis of the Core Work-Processes and the Development of the Advanced Occupational Standards	**3.1. Core Work-Processes (8-12)**
	3.2. Core Competencies
	3.3. Detailing of Core Work-Processes
4. Sectoral Committee/ Expert-Workers Workshop	**4.1. Finalising the Documentation of the Advanced Occupational Standards**
5. Chamber of Commerce and Industry	**5.1. Endorsement of the Advanced Occupational Standards**
6. Ministry of Manpower	**6.1. Officiating of the Advanced Occupational Standards**
7. Developing Advanced Detailed Curricula	

The work-process analysis is a rather complex instrument, which is applied with the final goal of identifying the skills, the knowledge and the competences which need to be conveyed through the ADC. Next, we will proceed through the individual steps of conducting these analyses to establish occupational standards and the detailed curricula.

First: Establishing a draft profile of the training occupation/activity

The "nucleus" from which the work-process analysis starts must be a draft statement regarding the nature of a particular occupation or activity and the training required in order to master it. We call this an "Occupational Profile". This should be accompanied by insights from a sector analysis (Spöttl, 2008) such as reference to related occupations/activities, a brief portrait of the social embeddedness of the particular occupation/activity including information regarding the salary, and a brief description of the possible career progression paths. A list of the necessary components for the Occupation/Activity Profile can be found in Figure 2.

Figure 2: The necessary components of an occupational profile/activity profile

1. Name of the occupation or activity.

2. Description of the related occupational cluster, group or sector.

3. Prerequisites to be eligible for working in this occupation.

4. Duration of education and training.

5. Specific skills and quality criteria for the particular profession.

6. Description of the typical scope of working fields and responsibilities.

7. Description of qualification to be obtained.

8. Training venue, career perspectives (specialisation, further education etc.).

Second: Embedding the occupation/activity under study in a structure regarding level of workmanship and cluster of occupations

For designing appropriate training programmes and for assisting individuals in finding their place in employment it will be necessary to reflect the occupation/activity under study from the perspective of a total system's approach. This will render important information regarding its contribution to the world of work, to the national economy and to the individual. This complex procedure of a total system's embeddedness can be partly facilitated by introducing two structural dimensions: "levels of workmanship"/"levels of skilled work" and "affiliation with occupational clusters" (Spöttl et al., 2017).

Third: Forming a team of experts to conduct work-process analyses

The general traits of an occupation or activity have to be differentiated from what is unique in a particular situation and may therefore not be relevant for this purpose. Furthermore, it has to be observed that the work-process analysis is only the first, though important, step for proceeding towards the development of ADCs. Therefore, the team of experts through their qualifications also has to ensure the continuation of this development process towards the final product of detailed curricula.

The thrust of work regarding the work-process analysis lies with the subject-matter experts. That is why it is advisable to employ two senior experts in this area. Ideally their qualifications should be supplementary to each other. Yet the mere fact that two experts are charged with this work already incorporates a corrective component.

In spite of the importance of the work of these two experts, the team-leader of the group of experts should be the senior expert for the format of the AOSs and for the procedure for developing them. This senior expert must have had prior experience with conducting work-process analyses and she or he will finally be responsible for keeping the group's work in line with the prescribed format and the proven procedure.

Furthermore, from past experience we have come to the conclusion that there should be a senior expert for the development of curricula in the team. If there is no curriculum developer involved in the work-process analyses, it is more than likely that the process of developing the ADCs out of the AOSs as the result of the work-process analyses will be held back by the curriculum developers' hesitation to accept the findings of the team.

Finally, there should be a senior expert for skill testing in the team.

For a brief characterisation of the professionals who should be involved in the analysis, see Figure 3.

Figure 3: Brief characterisation of the experts involved in conducting the work-process analyses

Criteria for the Selection of Experts
- Experienced in the sector/field
- Developed knowledge in the sector/field
- Current work is related to sector/field
- Work in advenced companies
- Work in flexible environments
- Work carried out complex & changing
- Developed shop-floor knowledge and experience

1 Pre-Analysis

2 Work-Process Analysis

Draft Advanced Occupational Standards

3 Expert Workshop

Finalised Advanced Occupational Standards

Team of Experts
- Two senior experts from the occupation under study which will be analysed. The experts must have shop floor experience
- One senior expert for curriculum development. He assures the continuity in the process of curriculum development.
- One senior expert for skill-testing. He assures the continuity in the process of developing related skill tests.
- One senior expert to assure the format of the development of the Advanced Occupational Standards. He represents the relevant authority and is team leader of the group.

Participants of the Expert Workshop
- The five senior experts listed above (see Team of Experts)
- 10 to 14 expert skilled workers of the occupation/activity under study
- One moderator

And finally, it is necessary to consider the experience of experts concerned with the verification of the draft AOSs that have been developed by the team of experts. For the purpose of this verification, either the draft standards should be submitted to a sectoral committee or an expert workshop should be convened.

In the event that there is a relevant sectoral committee with a sufficient number of representatives of private sector companies which are concerned with work in the occupation or activity under study, this should be given the preference over convening an expert workshop.

Fourth: Conducting basic research regarding the profile of the occupation and tendencies of further development

The team of experts responsible for conducting the work-process analyses should be familiar with the professional literature of the occupation/activity under study and with the trends in further development, particularly regarding the skills and competences required. Their experience must include familiarity with the latest tools and equipment as well as procedures of work.

Basic research has to be conducted regarding the scope of skills and competences for this occupation/activity in the country in question, and any variation in their effectiveness at the different places of work. This research could focus on interviews with local experts, but it should also be extended to written sources such as the professional literature or publications by the chamber of commerce and industry, relevant professional institutions or similar bodies.

Furthermore, this basic research should encompass an analysis of the organisation of the particular companies to be visited, with regard to their range of products or services and the design of their work-related organisation. This initial information can usually be taken from brochures and leaflets provided by the company – if possible, prior to the visit.

It has to be kept in mind that the requirements may differ from country to country because of cultural diversity and the level of technology applied. A proper assessment of the situation is needed, because certain high-tech equipment may be too expensive in a particular country and would be unlikely to be found in the workshops. Hence, suitability is an important aspect.

Fifth: Selecting companies in which to conduct the work-process analyses

It is evident that the number of relevant companies for conducting a work-process analysis is too high to involve all of them. Consequently, the team of experts has to consider in which companies they are most likely to find "actual manifestations" of the work-processes they have in mind. Choosing five to eight companies can usually be expected to cover the variations in the design of the work-processes which we need to address, depending on the objects of the production/work-process, the size of the company and other variables.

Therefore, an appraisal of the relevant companies needs to be conducted regarding these variables. The selection should reflect the existing variations in the design of work-processes. If the diversity of the companies requires it, it may even be necessary to visit more than eight companies. One day should be allocated for conducting the work-process analysis and it may be necessary to visit the company again in the event that any clarification is needed. A brief documentation of the choice of companies to be visited adds transparency to this important process.

Moreover, we need to secure access to the shop-floor level in these companies. From experience, it is very important for the success of the visits to companies that the purpose of

the visits (our need to learn from the actual workforce how the workers are engaged in the work- process) is made clear and is accepted by the company's management.

Sixth: Conducting the work-process analyses
All observations during the company visit have to be carefully documented. The function of any particular occupational action within the work-processes at the company must be clear from the report of the visit. It is also important to document in detail the training background of the workers as well as special talents which they may have.

The work-process analyses have to reveal all implications of the work, and detail all knowledge, skills and competences required for performance in the occupation under study. Observation of individuals at work and interviews with workers and management are the main instruments for generating this information.

Beyond the specific occupation/activity under study, the report needs to detail all business activities of the company being visited, and to convey an impression of its level of sophistication (e.g. stating precisely the welding technologies that are employed in a company). Furthermore, it must describe which role these activities play in the overall portfolio of the company, or, in other words, how they are embedded in more extensive business processes. It will be important to outline all core work-processes that make up an occupation or activity and the work-processes behind them. This will lead the researcher to identify the domain-specific skills that are peculiar for a given core work-process and the broad competences which bring the necessary dynamics to the required skill base to enable the skilled workers to cope with changing requirements in the workplace.

Observation and interviews as the main instruments of the work-process analyses need to be given special attention. The work-processes need to be analysed by carefully observing the skilled workers at their work. In particular, the following aspects have to be considered in this observation:

- ▶ the structure of the work-process,

- ▶ the organisation of the work tasks and the skills requirements that originate from the work-process,

- ▶ the competences that become apparent when considering the tasks that have to be mastered,

- ▶ the interconnections that need to be analysed behind the work, its contents, and the given circumstances that have an impact on the work as it is performed (cf. Becker & Spöttl, 2015).

A report has to be issued for each work-process analysis. This report serves as a documentation for the process of establishing the AOSs. It is suggested that the above detailing of the work-process analyses be employed as a means of structuring the report.

Seventh: Developing a draft Advanced Occupational Standard

For each company visit respectively for each work-process analysis there must be a comprehensive report. This report should reveal how the occupation or activity under question fits into the overall production process of the company. Furthermore the report needs to describe the particular profile of the occupation or activity which we analyse in a given company. This report needs to be written by the subject matter specialists in the team.

All information has eventually to be arranged into the format of the AOS. that is a "narrative" has to be produced for each core work-process, followed by a "list of all core competences" which have to be employed in this core work-process and finally a "detailed description" of the activities involved regarding the following specifications: objects of skilled work; tools, methods used and organisation of skilled work; requirements in terms of skilled work and technology in use with regard to the customer, the company and the worker himself.

As already stated above the presentation of the AOSs follows a set format which provides the foundation for further proceeding towards the development of Advanced Detailed Curricula or the related advanced skill testing. This format is presented in Figure 4.

The format of the AOSs with the core work-processes, their narrative, their core competences and the detailing of each core work-process must always be in the mind of the team of experts. All findings will later on serve as the details for establishing the standards and these details must be helpful in designing curricula or skill tests.

The fundamental idea behind establishing the AOSs is their function of portraying the entirety of skills and broad competences needed to perform the skilled work of a particular occupation/activity. In its structure this pool of skills and competences is composed in the following way: A sequence of core work-processes encompasses all areas of skilled workmanship which together constitute the sum total of all know-how, all competences and all skills which are required.

Therefore, it must be the first and foremost target of the work-process analysis to focus on the skilled workers, to identify the core work-processes and to arrange them in an order proceeding from the basic ones to the more complex. In most cases it is domain-specific skills which lend their uniqueness to the shaping of core work-processes. "Polishing" as part of the occupation of carpentry has already been stated above as an example for such a core work-process. Yet, broad competences such as the interpretation of complex fault-diagnosis in the automotive field could also be the distinctive feature of a core work-process.

Figure 4: Format of the AOS

Occupational Standard: [name of Standard]

CORE WORK-PROCESS – NARRATIVE

[short description of Core Work-Process]

What has to be done? – Main task

The overall and detailed tasks to be coped with.

What are the requirements?

How can the requirements be complied with?

How are requirements interlinked?

Solutions of problems

....

OCCUPATIONAL COMPETENCES

[Occupational Core Competence 1]

[...]

Place work tasks related to the core work-processes above as well as the verb defining the competency level

DETAILING THE CORE WORK-PROCESS

Objects of skilled work	Tools, methods used, organisation of skilled work	Requirements in terms of skilled work and technology in use
▶ [...] Write down activities relevant to carrying through the core work-processes, ▶ relevant steps, ▶ relevant products, ▶ relevant phenomena (such as customers, hidden tasks ...).	**Tools** ▶ [...] Write down the tools relevant to carry through the activities under "objects". **Methods** ▶ [...] Write down the methods to carry through ... **Organisation** ▶ [...] organisation necessary/relevant to carry through the activities named under "objects".	▶ [...] Write down the requirements defined by the ▶ customer, ▶ company, ▶ government, ▶ skilled worker himself/herself.

Eighth: Verification of a draft Advanced Occupational Standard by a sectoral committee or a workshop with expert skilled workers

On the basis of our insights from the work-process analyses we have completed the draft AOS with all its core work-processes. This presentation has followed the set structure of narrative, core competences etc. as has been indicated above. This draft standard is then ready for ver-

ification by a sectoral committee or an expert workshop. And again: in any case, the team of experts who have presented the draft has to participate in this verification.

It is assumed that this double check will make sure that the team of experts who conducted the work-process analyses arrived at the right conclusions and that necessary revisions are put into effect. Furthermore, the review by expert skilled workers is an important indication that the representatives of the occupation/activity as a whole are backing these standards as benchmarks for competence.

Ninth: Development of Advanced Detailed Curricula (ADCs)

A curriculum is a pathway to learning. We can build this pathway by first identifying the competences that are needed for performance in an occupation. The complete set of these competences is termed an "Occupational Standard". The "Detailed Curriculum" is then the description of the learning programme, which enables the trainee to acquire the knowledge, skills and attitudes necessary to master the competences.

The conventional "Occupational Standards" had been developed out of the analysis of work tasks and consequently lost their validity when a task became outdated, e. g. through the introduction of new technologies or changes of work organisation. The new AOSs are based on an analysis of work-processes and they attempt to grasp the change which is immanent in the work-processes.

The AOSs for a particular occupation describe all competences needed for successful performance in the workplace. They therefore provide the basis for the development of a detailed curriculum. And since we need to maintain the advantage that the AOSs have over the conventional standards, we should use the term "Advanced" Detailed Curricula for the new curricula.

The core work-processes and the sequence of core competences for each of them provide us with the overall structure of the contents for the Advanced Detailed Curriculum. Each core work-process is described in a narrative which already serves as guidance for curriculum development. The core work-processes stand on their own and they therefore constitute an entity for the development of the detailed curricula. This entity is then further structured by grouping the core competences for each core work-process according to the work flow (i.e. the central areas of work) into about two to four sub-entities. And finally, the detailing of the core work-processes provides us with the content-base for the curriculum.

Consequently, the structure for the ADCs is evident. Nevertheless, the description of the individual learning events needs some further consideration. In order to proceed from just carrying out tasks to performing successfully in a changing work-process, we need to involve all capacities of the trainees, i.e. beyond their expertise in the technical/professional field, they need to apply their human and social competences and their methodological competence combined with their willingness and capability for lifelong learning.

Hence, we need to define competences in these three areas, and for each item of the detailed curriculum we need to be clear about the content to which we refer. In summary: we need to express the pathway to learning in the following three dimensions of competences:

▶ Technical/Professional Competence extends from an overview and orientation regarding all skills required in an occupation to system-related knowledge and skills and, furthermore, to detailed functional knowledge and skills and advanced special knowledge and skills.

▶ Human and Social Competence extends from the willingness to act in a reliable way and to accept uncertainties, to the readiness for self-reflection and to the ability to work under pressure; moreover, the ability to work in teams and networks needs to be paired with communicative and cooperative competence and receptiveness to constructive criticism,

▶ Methodological and Learning Competence extends from the ability to set goals and structure assignments to finding sources with relevant information and the ability for problem-solving, planning and monitoring in a self-reliant way; moreover, the ability for life-long learning and the application of learning strategies are needed.

Tenth: The five steps of detailing an ADC
The basic explanation for the background of the development of ADCs is intended to provide an orientation regarding the specific approach to curriculum development based on work processes instead of tasks. With this orientation in mind we should now address the actual task of developing an ADC. This has to be done in a five-step process.

Step 1: Overview regarding the competences that need to be conveyed
As a necessary preparation for developing detailed curricula, the expert should go through the Advanced Occupational Standard for the particular occupation and understand how the whole occupational profile is build up around the sequence of core work-processes and the inherent core competences. Furthermore, the expert should intensely study the first core work-process. Starting with (1) the narrative for a comprehensive understanding of this phase of developing one's craftsmanship. Then going to (2) the core competences and understanding the internal structure of the particular core work-process, from the initial steps of getting prepared for this phase of craftsmanship to carrying out the core work-process and to delivering the product or service, or to moving ahead to another core work-process. Finally, (3) the detailing of the core work-process has to be carefully explored as a structured contextualisation of the work-process which represents this phase of the occupational domain. First the focus should be on the "objects of skilled work". Next, more specifically, the "tools (and) methods used, (and the) organisation of (the) skilled work" are outlined. And finally, the "requirements in terms of skilled work and technology in use" are introduced in relation to the customer, the worker and the company.

Step 2: Sub-entities which mark the work flow in a core work-process
As already stated above, each core work process has to be regarded as an entity based on the same structure. This entity encompasses all competences which constitute this core work-process. The core work-process is initiated in some way, is carried through, and is completed in the delivery of a product or a service. Consequently, when developing a detailed curriculum, this entity needs to be further broken down into sub-entities which mark the detailed work flow within the particular core work-process.

In order to establish these sub-entities we refer to the core competences which have been defined for this core work-process. We group and name the core competences according to central areas of work which have to be traced in their correspondence with the work-flow. We need to define between two and four sub-entities, such as e.g. for the core work-process of "Standard Service" for the Automotive Mechatronic the following four sub-entities:

(I) Vehicle Reception and Management
(II) Preparation for the Service
(III) Carrying through the Service
(IV) Vehicle Delivery

Step 3: ADC based on a structural model of occupational work (example "Automotive Mechatronics")
Formulating the Advanced Detailed Curriculum is the main step to be taken, because it entails the formulation of all details needed to make sure that the worker/trainee will be able to perform successfully in the workplace. Our main resource for this step is the Detailing of the Core Work-Process. The "detailing" presents a structured outline of the whole work-process. It is based on the following perspectives of occupational work (example taken from Automotive Mechatronics).

1. Objects of occupational work
The specific object of occupational work encompasses the technical systems, the functions of the technical systems and their components, the design and functional safety (of vehicles), the administrative services and the customer.

2. The tools and equipment used, the methods of work that are applied as well as the organisation of the work that is followed
This section encompasses the organisation of the workshop and of the particular work place in connection with the employment of tools and equipment and the respective methods of work.

The organisational structure, the tools and the equipment have considerable implications regarding the complexity of the work-process and the methods of work that should be applied. They are important elements for determining the quality of occupational work and

the requirements thereof. They have an impact on the wider organisation of the work-processes in all their details.

3. Requirements regarding occupational work
Requirements regarding occupational work address occupational work externally. These requirements result from the interests of customers, from legal stipulations which stand for social interests, from the interests of employers, from health and safety considerations and from requirements that have been brought up by the workers themselves. This dimension is multifaceted, and secures the outcome of getting the work properly done from the perspective of society. This explains that occupational work can just be regarded as a job to earn a living or as a task relevant for society and challenged by (moral and) ethical claims.

This whole scenario needs to be considered when developing the Advanced Detailed Curriculum. Our aim for the training programmes must be to convey competence for performance in the work-process. This competence in performance is achieved by following a holistic approach which targets both the vocational and the personal development of the learner. Therefore we need to employ a model of competence that considers all capacities of the individual. We find it in the three-dimensional model of competence that has already been explained. It entails (1) technical/professional competence, (2) human/social competence, and (3) methodological and learning competence.

Competent performance in the work-process at the place of work needs to encompass all three dimensions of competence, yet since our focus is on the work-process, the technical/professional competence has a certain lead function in guiding us through the work-flow.

All aspects of occupational work that are stated in the detailing of the core work-process have to be covered by the Advanced Detailed Curriculum with reference to the particular dimension of competence. The intrinsic value of addressing the three dimensions of competence partly lies in the transferability of the know-how that is being built up in each of them.

4. Conclusion

What is our concern? We want to identify the skills, competences and the knowledge that skilled workers must have at their command today in order to perform successfully in the workplace, particularly in high-tech occupations. The steps are: establishing occupational profiles, conducting work-process analyses, following the format of the advanced occupational standards, defining the competences needed for performing in a work process, establishing the structure of an advanced detailed curriculum, establishing sub-entities which mark the work flow in a core work-process, and developing the Advanced Detailed Curricula for the sequence of core work-processes.

Only by applying work-process analyses are we able to unfold the complexity of today's work-processes. Consequently, work-process analyses, Advanced Occupational Standards and Advanced Detailed Curricula are the three subsequent, inevitable stages of development.

They need to be mastered in order to proceed from defining an occupation or occupational activity to identifying the domain-specific skills and the broad competences, and designing the training programme for successful performance in this occupation/activity or for testing the command of the detailed competences.

A particularly skilful procedure is required when selecting the companies for the work-process analyses. This selection needs to provide a relevant image of the particular sector. It is especially advantageous that the work-process analyses encompass the regional business structures and that a transfer of the experience from other countries is not an option. For the teams who carry out the work-process analyses, it is a special challenge to cover the business structures and at the same time to identify the qualifications that the skilled workers must have.

Again, it is a special advantage that all findings regarding the development of curricula are related to regional circumstances and it is exactly these requirements and qualifications that are compiled before they become part of curriculum development.

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▶ # Global Perspective and Trends in Work-based Learning of Technical and Vocational Education and Training Programmes in Sub-Saharan Africa

1. Introduction

Work in its various forms reflects different aspects of a people's culture. The artefacts and services resulting from these forms of work also depict the people's worldview. Through socialisation and education, the young and novice are trained on different types of work and how to execute associated tasks in different areas of social life and productivity. Work in this discourse is not restricted to the activities an individual undertakes in order to earn a living either in paid or self-employment. In sub-Saharan Africa (SSA), for example, before the advent of formal education, training for work was and often still is integrally woven into the socialisation process by informal types of education. This meant that work-based learning experiences rather than pseudo activities were the hallmarks of informal education at the family and community levels. Work-based learning experiences were acquired through household chores, ranging from simple unitary activities entailing real-life domestic contexts to complex tasks incorporated in trades like hunting, farming, midwifery, bone setting, rain-making, herbal medicine, blacksmith, pottery etc. There was hardly any incidence of unemployment, since employment and education were directly tied to the socio-economic needs of the community.

The advent of formal technical vocational education and training (TVET) in SSA countries for workforce development instituted a system of training that provided not only practical skills/techniques but also offered theoretical knowledge, methodological knowledge, generic skills and general knowledge about the trades/occupations (Eraut, 2004 as cited in Tynjälä, 2008). According to Tynjälä (2008), although most of these types of knowledge are described as transferable, there is hardly any empirical evidence on how far the methodological knowledge and practical skills acquired by the student while in school/training in any

occupation are transferable to the workplace. The challenges to the transfer of learning from school-based knowledge and skills to the workplace explain in part why some TVET graduates seem unemployable because of their inability to satisfactorily perform in their trained occupations. Furthermore, the supply-driven approach (compared to the demand-driven approach in which industry needs dictate the nature of TVET programmes) by TVET institutions in providing formal TVET programmes in sub-Saharan Africa also accounts for the challenge of transferring school-based learning to workplace skills. These TVET institutions keep admitting and training students without reference to the demands of the industry, thereby graduating students who cannot secure employment or who possess little or no skills needed by the industry.

The need to improve the occupational skills possessed by TVET graduates explains the increasing prominence of work-based learning (WBL) in different designs of TVET curriculum. The European Centre for the Development of Vocational Training (Cedefop) (2015), defined WBL as intended and structured non-formal learning; being of direct relevance to the current or future tasks of the learner; provided in a work-based context, that means either in the workplace, in settings simulating the workplace or outside the workplace, but with specific learning tasks that must be directly applied in the workplace and reflected upon afterwards. In the formal school system, WBL is described as the curriculum component that links school-based instruction with work-related activities and experiences (including employer, community input, and student engagement) that promote learning, and access to future educational and career opportunities (Darche, Nayar, & Bracco, 2009). Within the informal sector, WBL is the sole method of apprenticeship in which there is no demarcation between work and its education components.

There are three types of WBL in SSA, namely informal, non-formal and formal. Informal WBL is carried out through informal apprenticeship and family/community-based work-related activities. Non-formal WBL in SSA countries is implemented in the forms of company/corporate induction activities, formal apprenticeship, and in-service training/continuing professional development programmes. Formal WBL is implemented in the TVET institutions in the forms of the internship, the school-based enterprise (SBE), and one-off assignments/activities (field trip, work shadowing, occupation-based project, career day events, career mentoring etc.). Irrespective of the type of WBL, its benefits include enabling a smoother school-to-work transition, bridging the gap between theory and practice, providing needed experiences/skills (unavailable to the school due to inadequate facilities), arousing students' interest in their chosen career, building cordial relationship between the school, industry and community, and expanding the professional networks of students, teachers and administrators.

The benefits of WBL internationally are well-known (Cook, 2017, Cedefop, 2015, Darche et al., 2009) and conjure a very positive perception among policy makers, administrators, and citizens. The positive perception of WBL is based on its effectiveness in informal sector training wherein the graduates are guaranteed employment, and also on its workplace so-

cialisation benefits for young people. Similarly, WBL is perceived positively by formal TVET curriculum planners because of its potential in promoting competency-based education that should be the logical follow-up to the appreciably improved access to basic education in SSA countries (United Nations, 2015). Interestingly, too, there have been increasing collaborations between formal TVET institutions and informal sector enterprises, such that students now intern in informal sector enterprises since there are fewer committed formal sector enterprises to accommodate the teeming number of TVET students (Reinhard, Pogrzeba, Townsend, & Pop, 2016). Furthermore, the perception of the international development agencies of WBL in SSA is equally positive. Many international intervention initiatives have focused on providing out-of-school training for the youths and setting up school-based enterprises to enhance the quality of human capital available for implementing projects based on the sustainable development goals (SDGs). These positive dispositions to WBL in SSA account for the trend/motivation in integrating it into the formal school curriculum, providing a policy framework, funding for competency-based initiatives, and the increasing cooperation between formal and informal TVET programmes.

In spite of the positive perception and on-trend status of WBL in SSA, there are inherent challenges that confront curriculum planners, policy makers, students, and administrators on effective implementation and adoption of different types of WBL for skills acquisition. In the informal sector, there is a weak community of practice as well as unstructured continuing professional development for master craftspersons, which poses serious threats to any meaningful collaboration between the informal and formal TVET programmes. The TVET institutions ought to ascertain that their students are not misinformed by ill-informed craftspersons while placed as interns in informal sector enterprises. Again, as the national vocational qualification framework gains popularity in SSA, the cooperation of informal and formal TVET programmes might be increased. Different WBL designs and implementation practices are suited to varying instructional situations, which TVET practitioners are unaware of and researchers ought to study. Furthermore, research on WBL is needed but is facing challenges of a different kind, relating to research focus, data collection and analysis, and instrument design. In order to address these issues raised regarding WBL in SSA, the chapter is aimed at:

▶ Presenting the general state and perception of TVET WBL in some SSA countries as well as highlighting the WBL policies of Nigeria and South Africa, the major economies of the sub-region.

▶ Illustrating some WBL programmes in Nigeria, and international perspectives on WBL and lessons for SSA countries.

The methods adopted in collecting and analysing the data for the chapter include an extensive literature review, content analysis of WBL policy frameworks in Nigeria and South Africa and discourse analysis (serialising the author's reflections on professional and consultancy experiences with TVET practitioners relative to their language usage and practices on WBL).

The deconstruction and narrative-analysis forms of discourse analysis were used to represent the language and dialogue with TVET practitioners on their perception of WBL. The content of the chapter is presented under three sub-headings that cover WBL implementation frameworks in Nigeria and South Africa as well as the lessons for other SSA countries.

2. Work-based learning policy framework in SSA: Examples of Nigeria and South Africa

The central purpose of any country's WBL policy is to supply the economy with the most suited workforce. In many instances, the WBL policies span across many government ministries beyond the ministry of education in any country. In Nigeria, for example, there are WBL policies in the Federal Ministry of Industry, Trade and Investment, the Federal Ministry of Labour and Employment, and the Federal Ministry of Education, among others. The Nigeria National Policy on Education provided for the following WBL programmes: 34 entrepreneurship courses at the senior secondary schools, internship for polytechnics, universities, and colleges of education, and SBEs at the technical colleges' production units (Federal Government of Nigeria [FGN], 2013). In South Africa, the policy/laws relevant to WBL include the National Education Policy Act (27 of 1996); the South African Schools Act (84 of 1996); the Constitution Act (108 of 1996); and the Further Education and Training Act (98 of 1998) (Reinhard et al., 2016). These policies/laws are influenced by the three dominant types of WBL in SSA as shown in Figure 1.

Figure 1: Types and Characteristics of WBL in SSA		
Informal (Community/family-based)	**Non-formal (Non-governmental/ corporate organisations)**	**Formal (Educational institution)**
▶ Apprenticeship ▶ Family-based training	▶ Apprenticeship ▶ Induction programme ▶ In-service training	▶ School-based enterprise ▶ Internship (paid & unpaid) ▶ School-based activities (career exploration, awareness and preparatory)

However, different national training agencies are responsible for most of the non-formal WBL in SSA countries, and in the case of Nigeria, the Industrial Training Fund (ITF) is charged with coordinating the Student Industrial Work Experience Scheme, which is a paid internship for TVET programmes, among others (ITF, 2011). The national training agencies in SSA provide non-formal training in all sectors of the economy, namely credentialing workplace trainers;

facilitating knowledge sharing between informal and formal sectors; providing guidelines for company-based WBL, incentivising companies participating in WBL, and benchmarking National Occupational Standards (occupation competencies required by industries).

The policy provisions for informal WBL are lagging behind the economic realities of SSA countries (Elder & Koné, 2014). In most technical trades within the informal sector, WBL is the primary method of training the apprentices. Owing to policy neglect, the informal sector training in many trades has remained unstructured and obsolete. The content, learning activities and methods of delivery are hardly updated. However, in terms of the proportional availability of the three types of WBL in SSA countries, there is still more informal WBL than the formal and non-formal types (Adams, Johansson de Silva, & Razmara, 2013). The preponderance of informal WBL in SSA countries justifies more policy focus on how to improve them. It is pertinent to note that the introduction of the national vocational qualification framework in Nigeria and South Africa has given some credence to the skills acquired from the informal sector, since they can now be assessed and properly valued.

Expectedly, in SSA countries there are research and implementation issues facing WBL design and implementation in TVET programmes, namely: accommodating the paradigm shift from a theory-based to a competency-based approach in instructional delivery; providing quality assurance (through a policy framework); data collection/analysis, instrument development, supervision and reporting on WBL; establishing a collaboration framework for inter-government and development agencies (UNESCO, 2016); and providing occupation-specific models for conducting industry-based supervision (Oyeniyi, 2012).

3. Trends in work-based learning programmes in Nigeria

In Nigeria, formal WBL is integrated into the curriculum of the TVET courses within the school system while informal WBL is conducted in informal sector enterprises, families, and communities. However, some WBL programmes are designed, funded and implemented as intervention initiatives in both the formal and informal sectors by international development agencies. It is worthy to note that these intervention initiatives are hardly sustained after the donors' funding comes to an end. In this chapter, the four examples of WBL programmes discussed are the school-based enterprises (SBEs) in TVET Institutions, Informal Sector-based Market/Mechanic Village School (MMVS), Student-teaching Practice in TVET teacher preparation, and the Students' Industrial Work Experience Scheme (SIWES) in TVET programmes. Two of these WBL programmes, (namely SBE and MMVS) are intervention initiatives by the African Development Fund and the UNICEF/Education Trust Fund (the author was the principal consultant for the two projects) while the other two are regular WBL within formal TVET programmes (of which the author had worked as SIWES and Teaching Practice Coordinator). These WBL programmes are discussed below, structured according to the following themes: brief history, basic principles of the programme, method of implementation, sustainability concerns and research issues.

3.1 School-based enterprises in TVET institutions

The establishment of the school-based enterprises (SBE) was part of the business develop-ment centre initiative of the Africa Development Fund's Skills Training and Vocational Ed-ucation Project (STVEP) of Nigeria. The objective of the STVEP, which ran from 2005 to 2016, is to improve access to quality vocational technical education in formal and non-formal training institutions in Nigeria (AfDB, 2005). The STVEP provided infrastructure and tools, equipped the laboratory, trained the staff of these institutions and provided seed money for establishing the SBEs.

The objective of the SBE is to provide students with work-related experiences to translate theory to practice within the school setting, and was implemented by the business develop-ment centres (BDCs) established in participating TVET institutions. These enterprises are linked to the 34 trade/entrepreneurship subjects that are among the core subjects at senior secondary level, introduced by the National Policy on Education (FGN, 2013). Generally, the business development centres were established to consolidate the dividends of various components of the STVEP, namely the supply of facilities/equipment and the training of the faculty/staff, and translating these into real-life benefits for transferring learning from the-ory to practice, transforming raw materials into finished products, and integrating learning with production principles into the trade subjects by implementing the SBE. The SBEs help students and local enterprises to start up and grow their businesses through the provision of educational resources for building capacity and empowerment. They provide WBL in schools so that students do not have to wait in vain for an industry-based internship given the lack of such opportunities. These enterprises are linked to the trade subjects taught in these TVET institutions and the production units of the technical colleges. The enterprises have business-es in water bottling, catering, clothing, poultry, fishery, block-moulding etc.

The implementation of the SBEs is based on the operations manual developed by the STVEP. In the operations manual, the departments of the BDCs (where the SBE programmes are governed) include human capital development, ICT, research development, revenue gen-eration and marketing, student and community engagement, and finance. The operations manual also provided for the following management entities: board of trustees, manage-ment committee, advisory committee, manager's office and internal audit. The organigram is shown in Figure 2.

Figure 2: The Organigram of the Business Development Centre (BDC)
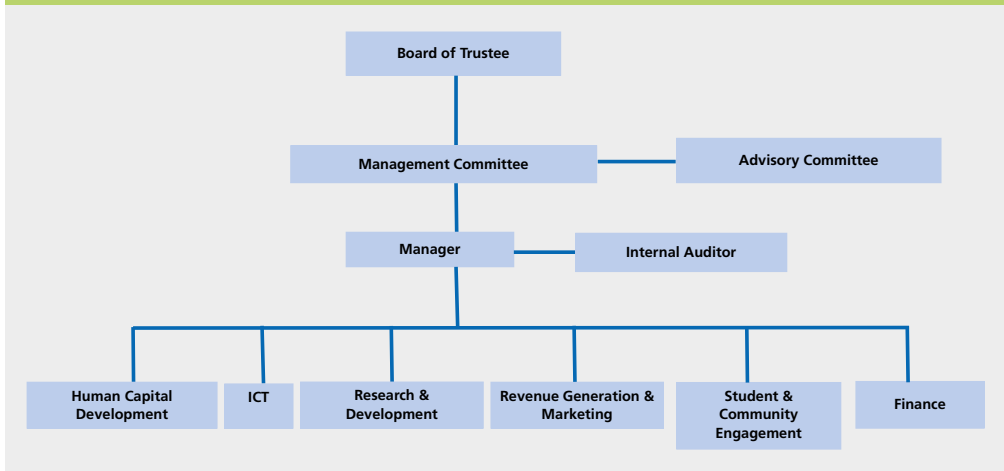
The Management Committee is chaired by the head of the institution while the advisory committee is constituted by members of the community as well as captains of industry. In order to confer proper legal and business status to these BDCs, the following measures were taken by STVEP:

▶ Registered the business name of the BDCs at Corporate Affairs Commission.

▶ Opened independent BDC Bank Account (different from the school accounts).

▶ Obtained the Taxpayer Identification Number (TIN) from Federal Inland Revenue Service (FIRS) for paying the Company Income Tax (CIT) and VAT (value-added tax).

▶ Obtained proper licenses that are applicable to the BDC's businesses e.g. National Agency for Food & Drug Administration and Control (NAFDAC), SON (Standards Organisation of Nigeria) numbers.

▶ Adopted enterprise software (some are simple spreadsheets) for managing the finance and assets of the BDC.

▶ Provided in the operations manual the allocation formula for the BDC proceeds – BDC sustainability – 40%, Maintenance cost – 20%, Finder's fee – 20%, School (Host institution) – 10%, Department (Project executing unit) – 10%.

The implementation of SBEs within formal TVET institutions is an innovation that elicits some research issues and concerns that administrators and researchers should consider. Some of the concerns include increased workload for participating teachers, disproportionate student focus on production activities at the expense of academics, and the challenges

of patronage of SBEs in rural schools. Table 1 presents these research issues relating to the implementation of SBEs within formal TVET institutions.

Table 1: Research Issues on the School-based Enterprises in Formal TVET Institutions	
S/n	**Research Issues**
1.	Comparative analysis of academic achievement/performance of students involved in school-based enterprise and otherwise.
2.	Techniques for integrating entrepreneurship skills into the school-based enterprises.
3.	Development of models for community partnerships in school-based enterprises.
4.	Qualitative and quantitative instrument development, data collection and analysis for school-based enterprise programmes.
5.	Proportionate allocation of credits/weight between academic and enterprise activities in curriculum designs.

3.2 Informal sector-based market/mechanic village school (MMVS)

The market/mechanic village school (MMVS) is an informal-sector-based intervention started by UNICEF in 1996 in response to the high dropout rate of boys from formal schools. These schools are located in south-eastern states of Nigeria. The states – Abia, Anambra, Ebonyi, Enugu and Imo – are in the territory of the Igbo tribe. The Igbos have patriarchal, achievement-oriented and male-dominated societies. Against the background of the Igbo worldview and the prevalent high rate of unemployment among graduates of different levels of formal education, there was a massive male drop-out rate from schools (UNICEF, 1999) in favour of the informal sector apprenticeship. The exodus of boys from formal schools justified the UNICEF intervention of taking school/formal education to the market and mechanic village. Indeed, the informal sector apprenticeship programme in the south-eastern states has flourished because the graduating apprentice (gaining his/her 'freedom') is "settled" by the master craftsperson, who provides the start-up fund. The boys are able to settle into successful careers in their chosen trade and contribute meaningfully to society.

The UNICEF intervention in the informal sector apprenticeship was designed to provide basic literacy and numeracy subjects that complement the trades' informal training provided in the market/mechanic village schools. The MMVS was established within the proximity of the market and mechanic garage where the informal apprenticeships are carried out. The governments, the trade unions, and UNICEF reached a pact to combine the apprenticeship with formal education through classes that are held thrice per week (12–2 pm). It was evident to all the stakeholders that without basic education, the graduates of the informal apprenticeship cannot do well in modern businesses and would be unable to read vehicle manuals, for example. UNICEF's out-of-school curriculum consisted of mathematics, English language and life-coping skills but had no certification at the end of the programme. How-

ever, the initial enthusiasm that the MMVS received dwindled because of non-issuance of a completion certificate acceptable by the formal education system. In time, the MMVS was challenged by low enrolment and poor reputation which informed the subsequent intervention by the Education Tax Fund (ETF).

The objective of the ETF intervention was to improve on the UNICEF out-of-school curriculum by aligning it with the national standard curricula at the basic and post-basic levels. The alignment also entailed the awarding of certificates to apprentices, similar to those awarded in regular formal schools. The intervention also provided trade subjects in addition to the basic literacy and numeracy content of the UNICEF programme. Other highlights of the ETF intervention included the following:

▶ Thematic restructuring of the two existing basic education curricula and UNICEF curriculum into one flexible (lower and middle basic curricula) curriculum to be completed in three years (Ogwo, 2013).

▶ Thematic restructuring of the existing upper basic and secondary school curriculum into a more flexible two-year programme.

▶ Introduction of life-coping skills from the UNICEF out-of-school curriculum as a new basic education subject: The subject includes ethics, information & communication technologies (ICT), health and physical education, etc.

▶ Market School students will be sitting for the same certification examination as every other student of equivalent level in the country.

There are some concerns and research issues associated with implementing this type of WBL that involves cooperation between the informal sector enterprises and formal education system. Provision of suitable instructional materials, building the capacity of teachers and the political will to sustain the programme are some of the concerns for this type of WBL. However, the related research issues are presented in Table 2.

Table 2: Research Issues relating to the Market/Mechanic Village Schools (MMVS)	
S/n	**Research Issues**
1.	Regular evaluation of the MMVS programme.
2.	Tracer studies of the graduates in terms of academic achievement and progress in business.
3.	Development of ICT–based instructional material.
4.	Methods for improving the flexibility and adaptability of the MMVS to students' needs.
5.	Provision for the special needs students.
6.	Integrating the MMVS into the National Vocational Qualification Framework.

3.3 Student–teaching practice in TVET teacher education programmes

Student-teaching practice is the type of WBL in which the TVET student-teacher is afforded the opportunity to observe as well as practice the technical and pedagogical skills acquired during the teacher preparation programme. In Nigeria, it is a mandatory component of the teacher preparation programmes of the colleges of education and universities that offer TVET teacher education (cf. Ezekoye in this volume). The colleges of education award the National Certificate in Education (NCE), which is the lowest-level teaching qualification in Nigeria, while the universities award various levels of academic degrees. Student-teaching practice is an unpaid internship for the student-teacher although, in government-owned institutions, the college-based supervisor is paid an allowance for the supervision while the cooperating teacher is not paid.

The implementation of the student-teaching practice in the TVET teacher education curriculum is regulated by the National Commission for Colleges of Education (NCCE) and the National Universities Commission (NUC). Furthermore, the NCCE curriculum stipulates that the student-teaching practice should last 26 weeks and bear a maximum of six credit units, while the universities allocate 12 weeks and six credit units for it. The student-teaching practice is assessed by at least four different assessors and for a minimum of 10 supervisions for the colleges of education; the universities do not have such an elaborate assessment structure. Student-teaching practice is supervised by the college-based supervisor and the cooperating teacher (Ogwo, 1999). The college-based supervisor awards 80 per cent of Teaching Practice Supervision/Assessment while the remaining 20 per cent is awarded by the cooperating teacher.

Cooperating teachers provide the professional guidance the student-teachers need in order to practice the art of teaching. In TVET programmes this entails teaching technical subjects in the classroom and the laboratory/workshop. Cooperating teachers ensure that the lesson plans are properly written, the technical contents are correctly explained to the students and the classroom and laboratory are professionally managed. They also guide the student-teachers in developing the instructional materials as well as assessing the learning outcomes. Over the years, research issues have emerged relating to the implementation and design of the student-teaching practice, as presented in Table 3.

Table 3: Research Issues relating to the Implementation and Design of the Student-teaching Practice	
S/n	**Research Issues**
1.	A correlational study between the assessment of college-based supervisors and the cooperating teachers.
2.	The relationship between the duration of the student-teaching practice and extent of acquisition of teaching competencies.
3.	Tracer studies on the relationship between the teaching practice assessment and career success.
4.	Development of upskilling programmes for the college-based and cooperating teachers for effective instructional supervision.
5.	Methods of collecting and analysing qualitative data obtained from the instructional supervision.

3.4 Students' industrial work experience scheme (SIWES) in TVET programmes

The Students' Industrial Work Experience Scheme (SIWES) is funded by the Federal Government of Nigeria through the Industrial Training Fund (ITF) that collects a levy of one per cent of the payroll of companies employing more than five employees (ITF, 2017). The scheme is operated by the ITF, and the coordinating agencies (National Universities Commission, National Commission for Colleges of Education and National Board for Technical Education), employers of labour, and educational institutions. As of 2007, the scheme had 59 universities, 85 polytechnics and 63 colleges of education that participated, comprising 194,890 benefiting students (ITF, 2011).

The SIWES programme is a WBL internship programme for the TVET students in colleges of education, polytechnics, and universities. The benefiting programmes include agriculture, engineering, technology, environmental science, education, medical science and pure and applied sciences. In some TVET programmes, it is a paid and credit-bearing internship of six months duration for polytechnics and colleges of education, and the universities. For the paid six months internship that is funded by ITF, the respective institution is charged with student placement and supervision. Each TVET institution appoints the SIWES coordinator who heads the SIWES unit that runs the daily coordination activities for students, supervisors (college-based and industry-based), college administration and ITF. The SIWES coordinator places the students in an appropriate industry, appoints the college-based supervisor and compiles the students' grades. In addition, the SIWES coordinator submits the lists of students and college-based supervisors to ITF for payment. Students are mandated to attend an orientation programme before commencing the internship. During the orientation, the students are informed of their responsibilities to the industry and their college-based supervisor, and the importance of documentation. Students are issued log-books to record their daily activities at the workplace. In order to authenticate the report on the log-book, in most of the institutions the student is expected to give a formal presentation to a panel of ex-

perts on his/her work experiences during the internship. The presentation forms part of the evaluation process for the student's final SIWES grade. Given the dwindling fortunes of the industrial sector and increasing number of participating students, there is a need for a major independent evaluation and re-engineering of the SIWES programme in order to sustain its efficacy for work-based learning. Table 4 indicates other research issues on the design and implementation of the SIWES.

Table 4: Research Issues relating to the Design and Implementation of the Student Industrial Work Experience Scheme (SIWES)	
S/n	Research Issues
1.	Developing a framework for the placement of formal TVET students in informal sector enterprises.
2.	Training industry and college-based supervisors on methods of data collection and analysis of WBL.
3.	Fiduciary evaluation of the cost of implementing the SIWES programme.
4.	Developing occupation-specific training curriculum for industry-based supervisors.
5.	The rate of occupational skills acquisition by students participating in the SIWES programme.
6.	Creating public-private partnership models for establishing school-based enterprises for increasing placement opportunities.

4. International perspective and trends in work-based learning: lessons for SSA countries

The current international perception of learning places a high premium on competency-based education implemented in practice-based settings. At regional and national levels, developed countries consider WBL an integral component of competency-based education. These countries adopt WBL to improve the worth and value of education as well as incorporating it into the totality of their national workforce development plans. To a large extent, these countries ensure WBL policy consistency by downplaying political considerations when planning for workforce development. For example, Germany's dual system of WBL has succeeded because the VET system originated from the productive sector and the captains of industry (social partners) are in the driving seat when it comes to VET education; moreover, every stakeholder places a high premium on quality workforce development. The same may not be said in many SSA countries. Illustratively, the dual system approach was adopted in Nigeria by the Institute of Management and Technology (IMT), Enugu, ANAMMCO (Anambra Motor Manufacturing Company), Enugu, and the National Board for Technical Education (NBTE) to run a programme on mechatronics. Originally, ANAMMCO was the joint venture (assembly and production of commercial vehicles – trucks, buses, and utility vehicles with a 5-ton payload and above) between the Federal Government of Nigeria and Daimler-Benz AG (now Daimler AG) of Germany. At the inception of the dual system, Daimler-Benz AG supplied all the

instructional materials needed for the training as well as ensuring that instructors in ANAM-MCO provided the industry-based training. The dual system was initially hampered by the political factor that insisted that all regions in the country establish the same programmes, even when the social partners' expertise, conviction, and commitment were lacking in the other geopolitical zones of Nigeria.

At the regional level, the European Union through the European Training Foundation (ETF) and the European Centre for the Development of Vocational Training (Cedefop) commissioned researchers and initiated regional cooperation among member countries to improve WBL and related issues. The African Union and other similar regional organisations can establish a framework for creating a peer learning mechanism, conducting regular research on instrument development, and for proper data management, all of which are imperative for improving WBL (Rensburg, 2008). Researchers in SSA countries are challenged to design WBL programmes suited to their economy, considering the fact that there are few industries to accommodate all students eligible for an internship. Indeed, the perspective of the native/local researchers is essential in providing adequate access to information, knowledge, practices in the research field and WBL tasks. Another important issue is the increasing collaboration between the informal sector enterprises and formal sectors of the economy; researchers in SSA countries need to leverage on these forms of collaboration in sustaining the development of WBL, and they are of particular importance in promoting the national vocational qualification framework, which recognises acquired skills irrespective of where the recipient received his/her training. According to UNESCO (2016, p. 7), "TVET can reduce access barriers to the world of work, for example, through work-based learning, and ensure that skills gained are recognized and certified". Sustaining the collaborations of all sectors of the economy for the implementation of effective WBL is imperative for all stakeholders in SSA countries.

5. Conclusion

Generally, SSA countries have adopted various forms of WBL that consistently reflect their national development policy (Rensburg, 2008) and prevalent workplace culture and level of industrial development. It is noteworthy to point out that WBL remains the sole approach in most informal sector apprenticeship programmes (ILO, 2012). However, these SSA countries can benefit from peer learning mechanisms and international best practices on effective WBL when properly articulated.

TVET practitioners and policy makers in SSA countries have a positive perception of WBL and its potentials in closing the skill gap between theory and practice. Rightly, policy makers regard WBL as an appropriate method for acquiring workplace competency and employment-focused education (Elder & Koné, 2014) although inadequate funding remains a challenge. On the other hand, the international development partners would readily intervene on WBL in TVET but do insist on ownership/counterpart buy-in from SSA countries for

such interventions (Adams et al., 2013). However, in order to sustain WBL interventions, the project must incorporate a sustainable long-term plan at its inception. Furthermore, proper planning and systemic implementation of WBL in TVET programmes that include the informal sector enterprises is needed for sustainable workforce development in SSA. Without research and valid data on WBL, the SSA countries could be recycling their mistakes and may fail in whatever planning done with invalid data. There should be policy consistency based on research evidence that guides the implementation of WBL programmes. In the final analysis, there are different success stories of WBL in TVET programmes across SSA that need to be scaled up and shared within the region by networking the institutions, disciplines, companies, states, and countries within the region.

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Benadeth N. Ezekoye

▶ Integrating Gender Issues into Work-based Learning Programmes of Higher Education in Nigeria

1. Introduction

Higher education is the third tier of education in sub-Saharan African (SSA) countries. It includes education at universities, polytechnics and colleges of education. It is an important source in producing skilled personnel equipped for sustainable physical and human development. The mission of higher education in SSA is to spur social development, higher production and economic growth, to maintain social cohesion, reinforce cultural identity and peace and eliminate poverty (Okebukola, 2004). Many work-based learning (WBL) programmes are prosecuted in SSA countries at the higher education level. However, there is gender insensitivity in these WBL programmes as manifested in poor school to work transition of girls, occupational maladjustment of female workers, occupational stereotyping and inadequate occupational gender accommodation in some technical occupations and services. Other manifestations of gender-insensitive WBL include inadequate female models in male-dominated programmes, and non-provision of mechanical devices/tools for female students for handling strenuous occupational tasks. Religious biases in curricular content/counselling components, subtle discrimination in evaluation exercises and poorly worded programme contents/objectives that preclude one gender are other manifestations of gender-insensitive WBL.

This chapter uses Nigerian examples to highlight some principles and practices that could aid the integration of essential gender issues into vocational education and training (VET) programmes in higher education. The gender issues discussed are related to curricular design and placements, programme monitoring and evaluation. Furthermore, the chapter enumerates some good policies and practices for effective networking of the higher education institutions, VET institutions and industries in the implementation of gender-sensitive WBL programmes.

2. Higher education in Nigeria

The United Nations (2015) in their 2015 Millennium Development Goals (MDGs) report stated an appreciable improvement in access to education in SSA. Accordingly, the focus should now shift from educational access to quality issues and skill education through the Sustainable Development Goals (SDGs) programmes in order to ensure functional education for all. While quality education should aim at growth in enrolment figures, it should also entail integrating diversity and inclusion issues in VET (OECD, 2012; Benavot, Resnik & Corrales, 2006) – for example, gender issues. The latter should focus on gender equity for males and females rather than gender equality connotations (UNESCO, 2012; ADEA, 2006; IBE, 2012; ILO, 2000), which sometimes arouse religious and cultural controversies. VET programmes and the SSA workforce will benefit immensely from a gender-sensitive curriculum that acknowledges varying cultural, religious and political antecedents in these countries while accounting for global acculturation effects.

Nigerian higher education institutions (universities, polytechnics, and colleges) offer several VET programmes. Teacher education programmes produce teachers for primary, junior and senior secondary school classes in Nigeria, and vocational education is part of the programmes for students wanting to become professional VET educators. Further VET programmes are dedicated to training manpower in applied sciences, technology, and commerce at sub-professional levels, and produce skilled, self-reliant and enterprising craftsmen, technicians and professionals (Okoro, 1993). The expectation is that on completing higher education, VET graduates will easily transit from school to work due to their possession of readily employable skills and knowledge for a given occupation. Unfortunately, the reality is different and the situation for VET graduates in the labour market is far from satisfactory, with many of these young people failing to gain employment or ending up working in poor conditions within the informal economy. Hence, according to Darche, Nayar & Bracco (2009), mere completion of higher education is not enough: for there to be continued success and development in their educational endeavour and careers, all students should have opportunities to develop cognitively and socio-emotionally, and to obtain workplace competence and career management skills. Access to a variety of work-based learning experiences can facilitate this growth.

In SSA, work-based learning is an educational strategy that links school-based instruction with activities that have consequences and value beyond school. It is informed by professional workplace standards and uses the workplace, or in-depth experience that includes employer or community input, to engage students and intentionally promote learning and access to future educational and career opportunities. The most common work-based learning elements of VET programmes in SSA include teaching practice, industrial work experience schemes, on-the-job training and apprenticeship programmes. For instance, in Nigerian higher VET, teaching practice and industrial work experience programmes are the two integral aspects of VET programmes aimed at providing students with opportunities to put their

theoretical knowledge into practice in real life situations. Although the programmes are facing numerous challenges, they remain vital in attaining the objectives of many VET curricula.

3. WBL practices in Nigerian higher education

Student Practice Teaching Programme: This programme provides the first opportunity for a student (student-teacher) to participate in activities involved in actual teaching situations (Olaitain, Nwachukwu, Igbo, Onyemachi, & Ekong, 1999) and is only available at the college and the university levels of teacher education. Both at the university and the college levels, teaching practice is compulsory for all students as part of their programmes. Teaching practice is an important pre-graduation requirement that affords the teachers-in-training the opportunity to put into practice what they have learnt in theory (Jekayinfa, Yahaya, Yusuf, Ajidagba, Oniye, Oniyangi, & Ibraheem, 2012). It is usually interchanged with such words as practice teaching, field studies, infield experience, and internship, among others. The exercise is designed to last for twelve weeks, which can be completed at a stretch or as two phases of six weeks each. The minimum teaching load for each student on teaching practice is 10 hours per week, with a maximum of 18 hours per week. The student is guided in applying teaching principles by a competent supervisor (cooperating teacher) in a real-life environment and acquires professional experience by observing and participating actively in all the diverse educational activities within the school. Evaluation of the student is done by proportional derivation of scores from the institutional supervisor and the cooperating supervisor/teacher. The student is expected to demonstrate similar professional competencies in laboratory and workshop practice in actual school-teaching situations. Practice teaching consequently becomes a genuine work experience for the student teacher. WBL in teaching practice situations helps the student to develop professional competencies and knowledge of teaching and management of learning. In some instances, is beneficial to the participating schools because it helps to make up for shortfalls in their student-to-teacher ratios.

Students' Industrial Work Experience Scheme (SIWES): This scheme was introduced in 1976 for students especially on technical and professional courses. It is a programme for students who are enrolled in institutions and who, through a cooperative arrangement between school and industries, receive a six-month practical training in the cooperating industries (Okorie, 2000). The major objective is to promote and encourage the acquisition of skills in industry and commerce with a view to generating indigenous trained manpower sufficient to meet the technological needs of the country. The programme is compulsory for every final-year student at university and polytechnic and for second-year students at colleges. However, the minimum duration for SIWES should normally be 24 weeks (6 months) at a stretch and the credit unit varies from different levels of higher education. The period is longer for engineering and technology programmes. The Industrial Training Fund (ITF) will not pay for any attachment period that is less than 24 weeks. The ITF finances this scheme (SIWES) and the decree establishing the ITF came into force in Nigeria in 1971. In most institutions,

SIWES is done at the end of the 2nd semester examination of either 300, 400 or 500 levels. The time and duration will have to be worked out jointly by each school and the directorate and the ITF.

Evaluation of the student is also done by proportional derivation of scores from the institutional supervisor and the industry-based supervisor who coaches the student through the training. During the industrial training, students are exposed to practical work experience in the industry in areas that are related to their courses. This exposure complements the classroom lecture and workshop practices, thereby enabling students to develop specific skills, knowledge and attitudes to work. Students in vocational and technical programmes through attachment to the industry are normally expected to successfully complete between a minimum of six weeks and a maximum of one year's training in an industrial establishment relevant to their various occupational areas.

4. Imperatives for integration of gender issues in WBL for higher education in Nigeria

The integration of gender issues into the WBL curricula of higher education in Nigeria entails planned consideration and fair recognition of both genders as well as inclusion into all aspects of programme design, implementation, monitoring, and evaluation. It also includes making it a norm for females and males to share resources and responsibilities and redressing any previous imbalance(s) on a just and equitable basis. A gender-sensitive WBL curriculum should provide policy language or statement devoid of unreasonable gender-specific bias (e.g. pregnant women or physically challenged or married women should not participate in the WBL programme) and should clearly promote gender equity in language. Remarkably, most WBL programmes do not consider contents that would prepare graduates for gender-related challenges at the workplace such as sexual harassment, emotional intelligence, language skills and group dynamics in a heterogeneous grouping. The above context highlights key characteristics of the hindrances to gender equity, access to quality WBL and for competency-based VET in Nigeria.

5. Common gender issues affecting higher education WBL in Nigeria

Social & economic mismatches

Nigeria is well endowed with abundant resources ranging from natural resources, cultural wealth and human resources; however, its peoples remain poor (Africa Union, 2004). Most of the poorest people in Nigeria as well as globally are females and the underlying causes are social inequalities and the lack of opportunities for females purely because of their gender (APF, 2006). Thus, devastating effects of poverty, discrimination and lack of opportunity affect females in multiple ways (level of education, income levels etc.). A female with higher education and career aspirations tends to be viewed as aggressive and therefore her chances

of finding a husband are reduced considerably. There is an inherent prejudice in Nigeria that the more educated the woman is, the less submissive and the more arrogant, sophisticated and discounted she may be as a wife. Moreover, female education is compromised by poverty; in case of strained resources parents prefer to send a boy child at the expense of a girl child as a coping strategy. Parents also suggest technical occupations for their sons and service occupations for their daughters. Therefore (APF, 2006) females are vastly under-represented in many occupations, especially in professions such as science and technology, and males mostly focus on VET programmes that are technology-based.

Religious & cultural values and attitudes

In a constantly changing and increasingly technological and globalised world, religion and culture still play a significant role in influencing social and educational behaviour. Religious and cultural values are judgments regarding what is valuable or important in life, and these values vary greatly from one culture to another. In some Nigerian communities, culture tends to bolster the females to rely on the males for sustenance and provision for the family; males are expected to play the breadwinner role while females are supposed to be homemakers. In those communities, the concept of hard work varies between male and female, thus affecting the ethical aspects of WBL. Various cultural values have historically contributed to gender disparity in education. According to Denga (1993), one prominent cultural view is that it is better for the female to stay home and learn to tend to her family instead of attending school. To explain the fact that more boys than girls participated in education, Nigerian tradition is being identified as a host of constraints (Obasi, 1997). It has been described as a tradition that attaches a higher value to a man than a woman, whose place is believed to be the kitchen. Marriage traditions tend to encourage female children to marry at an early age, in some instances at the tender age of 15 years. Additionally, some religious sects in Nigeria impose different work standards and professional behavioural expectations for males and females, and in many instances, the differences tend to suppress the females' ability to excel or freely choose certain occupations in VET.

Occupational stereotypes

Most Nigerians prefer professions other than teaching (Adelabu, 2005) owing to the mode of payment of salaries, fringe benefits, promotion prospects and working conditions. This attitude influences the students' WBL experience during the teaching practice. Also, women usually participate more frequently in vocational areas like home economics or agriculture than in industrial technology and computer courses. Thus, there is poor enrolment of the females into industrial technology courses like mechanics, woodwork, electronics etc. Additionally, the employers' discriminatory attitude towards women is an extensive issue. They have a preconceived idea of the types of jobs suited for female students, which narrows the range of occupational tasks they are assigned to do. Fewer women are employed in high growth areas such as science, technology, engineering, and the information and communi-

cations technologies (ICT) sector, and they comprise only around one-fifth of the ICT work-force (World Bank, 2014). The implication is that training opportunities are more restricted and limited for females, and this also affects their placement during WBL programmes.

Gender bias in self–concepts, behavioural expectations and performance evaluation

Females are significantly more constrained in their decision-making, which leads to a worse training experience, less support, and ultimately results in worse training outcomes compared to males. Obviously, they do experience a strong gender bias when being evaluated for promotions on their level of performance as well as their potential impact. Research within professional groups shows that women have to work significantly harder to be perceived as equally competent as men (Lyness & Heilman, 2006). Unfortunate assumptions are sometimes made about females' ambitions and abilities. Research has shown that females do not sufficiently fulfil their career expectations due to gender stereotypes such as the ascription to women of having less ambition and a lesser company commitment due to family responsibility (DDI, 2009).

6. Integrating gender issues into WBL programmes

There is currently growing recognition throughout SSA of the importance of integrating gender issues in VET curriculum development and implementation processes. Worldwide, it is increasingly being acknowledged that gender equity and VET development are mutually supportive goals when striving for sustainable economic and social development. Good WBL practice requires that gender challenges faced by males and females in VET are properly understood – in order to enable all students to benefit equally from the programme and greatly enhance their success in the transition to the world of work. An educational environment that supports gender mainstreaming and the development of gender-sensitive WBL curricula is central in strengthening VET's potentials and thus for national development in the countries of SSA. Based on Nigerian experiences and practices, the various ways policies have taken care of gender-sensitive issues in this regard are outlined below. It presents some guidelines for the implementation of gender-sensitive WBL programmes in the higher education of SSA countries.

6.1 Design aspects and requirements of gender–sensitive WBL programmes

WBL programmes (Teaching Practices and Industrial Training) are compulsory credit-bearing courses to be completed by every student in partial fulfilment for the award of a Bachelor's degree or Higher National Diploma or National Certificate in Education. No matter what their occupational area, students are expected to study and pass the technical subject matter, teaching method and workshop practice courses. In recent times, there have been accommodations for married and pregnant students including nursing mothers, who were

previously excluded from participating in WBL programmes. To reinforce the importance of this inclusive agenda and attain the programmes' desired success, functional child-care facilities are provided for nursing mothers. The period of the WBL programme is scheduled within the academic calendar of the host institutions and adapted to other peculiar issues, such as the duration of the VET programme, characteristics and experience of the students, and the culture and religion of the community, so as to enable the students to participate easily.

Access to placements

Procedurally, the first and foremost step in the placement process is to conduct a pre-posting survey (taking a comprehensive view) by the school-based WBL coordinator in order to ascertain the suitability of the cooperating school or the industry relative to the school curriculum. The survey is followed by a meeting between the school-based WBL coordinator and the participating school heads and managers, which helps in assessing their willingness to accept female/male students for industrial training and teaching practice exercises. On accepting to participate in the WBL programme as a cooperating school/industry partner, the school head/manager has to make some pre-arrival arrangements for the student, which include among other things, provision of accommodation and selection of a competent co-operating teacher/trainer (coach) for the student. Provision of the accommodation is not limited to providing empty rooms for the student to furnish but should include equipping the rooms with basic necessities. However, since WBL (teaching practice and industrial training) are regular annual exercises (Ogwo, 1999), schools and industries are better placed to acquire these conducive accommodations for successive groups of students.

Some institutions have used digital technology to arrange gender-specific accommodations for students by making use of online student registration tools, thereby facilitating the convenient posting of students to the practice schools and industries. In other words, the online registration of the WBL programme enables the students to freely make choices about the practice school and industry-training placement based on his/her personal and particular placement needs. The VET institution does not impose any particular school or industry on any student. On completion of the registration, the students are grouped according to geographical location, and each group appoints a leader irrespective of gender to liaise between the group and WBL coordinator.

Conscientisation of trainers and teachers for a gender-sensitive WBL programme

After the placement, every student is assigned to a cooperating teacher/industrial supervisor; he/she serves as the student's consultant through the course of the WBL programme. Indeed, the selection of the cooperating teachers/industrial supervisors is predicated on their integrity, qualification, willingness to cooperate, professional interest and competence. In addition to these qualities, trainers/teachers have to show competency in gender-sensitivity. This competency can be enhanced, and guidelines provided on the principles, terminologies, procedures, formats, and instruments for monitoring gender results.

The gender-sensitivity enhancement can be undertaken during compulsory orientation programmes for all institution-based supervisors during the pre-supervision (usually carried out before actual supervision commences) and placement orientations. These orientations avail both students and supervisors of the opportunity to discuss issues of common interest relative to gender sensitivity. Indeed, explaining the modalities of the programme and introducing the institution-based supervisors facilitates a favourable atmosphere of interaction between students and their supervisors from the very beginning (Ogwo, 1999). These preparatory activities help in no small measure in boosting students or participants' social skills and in reducing their anxiety during the supervision period. The students embark on the WBL programme with an open mind, without concerns about adverse gender-insensitive situations/tasks.

Gender issues during the training periods and placements

The student WBL placement is strictly in his/her area of specialisation. It is mandatory for the students to visit the cooperating school and industry before the formal commencement of the WBL programme. This enables the student to ascertain the conduciveness of his/her posting environment as well as to have a prima facie analysis of its suitability to his/her individual circumstances. If the student is genuinely dissatisfied with the school or industry, he/she will then have to request a re-posting from the WBL coordinator, especially if his or her adjustment problems are enormous. Students are reposted to another school/industry before the commencement of the supervision period.

During the induction period (this is the time following the student's arrival at the school/industry), the cooperating school/industry conducts a workplace orientation programme to enable the student to familiarise himself/herself with the school/industry staff, rules, facilities and environment. Thus, adjustment of the student to the primary task of the WBL is dependent on how fast he/she gains familiarity with the institutionalised provisions of the school/industry. The school head/industrial manager has to assist the student to adjust to both the environment and workforce responsibilities. He or she also assists the students in establishing a cordial relationship with other staff and the entire community.

In order to be gender-sensitive, the cooperating school/industry must make some pre-arrival arrangements for the student. For example, they arrange for baby-care for the nursing mother and gender-specific restrooms. For cases of illness, free medical attention (first–aid treatment) is given to the student. The pregnant and nursing women (students) are given the opportunity to express their choice of cooperating school and industry for the training. The Industrial Training Fund (ITF) also provides an industrial training allowance to the students for such items as transportation, accommodation, and meals during the training. Though not compulsory, an additional allowance may also be provided by the industry, and there may be provisions for mechanical devices/tools for female students for handling strenuous tasks. To build-up confidence among the students, especially the females during teaching practice, they are afforded the opportunity of at least one week of classroom observation by the co-

operating teacher before assuming full teaching responsibility themselves. To enhance the social and personal relationship with the female students, the cooperating teacher/ trainer assists them to form a proper perception of co-curricular activities (sports, club activities, labour and general duties) of the school as being integral functions of the school in which they are teaching and working.

6.2 Programme monitoring

A pre-supervision monitoring (taking a comprehensive view) or visit to assess the readiness of the students for the programme also enables the WBL coordinator to assess the extent of adjustment problems the students are experiencing, in terms of gender-related issues. If the student's problems are deemed insurmountable, the option of a reposting is considered. Whichever is applicable, the student has to adhere strictly to the specified channel of communication, irrespective of the severity of the gender-related infringement. There is a weekly validation and assessment of the student's industrial-attachment logbook and lesson notes by the cooperating teacher and industrial trainer. The student's industrial-attachment logbook is provided to assist the student to keep record of the training. It shows the departments and sections within the industry in which the student has worked, nature of the task carried out and the periods of time spent in each, while lesson notes are developed by the student-teacher to guide his/her class learning. It shows a detailed description of the course of instruction for a lesson including learning objectives, characteristics of the learner, instructional materials, teacher activities, learner activities, teaching strategy and evaluation process. Besides these, there should be regular observation of the student during instructional delivery and laboratory operation/task management, with suggestions proffered for improving the student's performance.

Keeping a record of the student's performance in acquiring the needed occupational competencies during the WBL programme is a continuous chain of exercises, and is carried out by both school supervisors for those in teaching practice and industrial-based supervisors for those in industrial training. It highlights areas of strengths and weaknesses and suggests the possible ways of enhancing them for better achievement of the training objectives. A further aspect is that females can seem physically weaker, and therefore in extreme cases, the cooperating school/industry helps them to maintain workplace/classroom discipline and enough precautionary measures are exercised in this regard to prevent the students from becoming diffident.

6.3. Assessment of students' learning outcomes/performance

All WBL programmes in higher education are usually supervised and graded outside the student's institution. To reduce the risk of sexual harassment on both the male and female participants as a result of saggy, shabby, flamboyant or indecent dressing in the workplace/classroom, neatness, decent dressing, and comportment are included as critical areas in as-

sessing the student by both the school-based and cooperating school/industrial supervisors. These criteria make up eight points on the assessment sheet. To provide a fair student assessment, the evaluation is done by proportional derivation of scores from school-based supervisors, and the cooperating school/industry. This system of student evaluation is critical and important, as examples abound where school heads/managers or their delegates have used student scores and reports as baits for sexual harassment of the female students. Having an amorous relationship or pretensions with any student should not be counted as any form of 'work-benefit'. It is gross professional misconduct on the part of cooperating school/industry staff to be wooing any rather naïve student into any form of improper relationship – as this could lead to disillusionment about the profession, on the student's part, especially when many such students are still only teenagers and young adults.

Moreover, no assessment of the student could be regarded as valid without due reference to the good judgment of the cooperating teacher/trainer. Having been so close to the student during the WBL exercise, the cooperating teacher/trainer should successfully avoid the error of generalisation, that is, where one mistake or merit in the student's efforts is made to override all others. After the supervision, the cooperating teacher/trainer has to assist the student in improving on the basis of supervisors' comments and observations. Often a WBL conference is organised for supervisors in order to share their experiences of the exercise and provide the opportunity to clarify ambiguous observations so that the students are not unfairly penalised. A confidential report about the student as well as his/her assessment is sent to the students' institution at the end of the exercise. This report serves as one major medium for communicating to the institution the areas of strength or gender-related issues encountered during the WBL. Thus, the student's evaluation should effectively be based on his or her mastery of his/her subject area, record keeping, dedication to duty, participation in co-curricular activities, and personality.

It remains a fact that workforce socio-cultural changes are gaining ground slowly, and particularly so in Nigeria, and therefore the benefits from the positive influence of planned intervention and dedicated implementation of gender-sensitive WBL curricular could be slow to materialise. The SSA countries cannot afford to stand by and watch the adverse effects of gender imbalances in all sectors of the economy when other countries in the world are making conscious efforts at gender equity in workforce development and utilisation. Therefore, incorporating gender-sensitivity issues must be made an integral part of the WBL curricula of VET. It is more than necessary to develop a gender-based WBL for VET programmes in higher education in order to enhance the programmes' relevance, efficiency and quality. The objective of this chapter would be well served, if VET practitioners adhered to making more gender-sensitive decisions and implementing them in the WBL activities of VET programmes. Ignoring these gender issues in WBL curriculum development will continue to result in poor learning outcomes, lower economic growth, and generally in low quality of life.

7. Policy recommendations and practices for effective networking of major WBL stakeholders

The development and delivery of gender-based WBL programmes, therefore, must be determined by industry demand and quality teaching and involve major WBL stakeholders including employers from industries and cooperating schools, students, and professionals from the training VET institutions. Imperatively, it is vital for these stakeholders to network across national and regional boundaries in solving the challenges of graduating incompetent workers' by integrating gender issues into their WBL programmes. There should be a support system or platform for sharing experiences, transferring technology as well as exchanging VET information and coordinating development among universities and VET institutions across national and regional boundaries on gender issues (Ezekoye, 2017). Such a system may include establishing a VET centre for excellence that provides a holistic framework for addressing issues impeding gender equity efforts in WBL for competency-based VET. Other networking activities will involve organising peer-learning activities among SSA countries and regions, and providing distance learning/e-learning programmes and technology-assisted resources for sharing VET information and instructions on gender education in WBL. What follows are a series of networking policies and practices that should help to improve the gender-responsive nature of WBL in VET programmes in higher education, both in terms of employment outcomes and overall gender transformation within society. These may include:

1) Promoting more job opportunities for female graduates by creating an inclusive workplace. The network should be able to identify employers who have demonstrated their commitment to providing a good work-life balance and who make positive statements about equality of opportunity in their recruitment advertising.
2) Ensuring equitable job recruitment at both national and regional/institutional and organisational level. It should not create barriers to merit-based selection, recognition, advancement, and retention. Employing a balanced set of recruitment strategies is crucial, as is ensuring that selection criteria are job-related.
3) Making pedagogy gender-sensitive through flexible WBL schemes and activities. To develop a pedagogy that will contribute to broadening the students' visions of what is possible for them as females and males and try to change their values concerning traditionally feminine and masculine activities and choices during their WBL programme.
4) Using technology in integrating gender issues into WBL programmes for quality competency-based VET. Technology that facilitates safe learning environments for people from different backgrounds and levels of expertise and supports communication.
5) Integrating gender issue management courses into VET programmes is imperative to improve the ability to critically analyse the theoretical assumptions underlying how individuals think about male and female, and about power, and how these intersect in management activities.

6) Providing for a uniform or common WBL scheme relative to its design, implementation, monitoring and evaluation will promote an active platform of gender sensitivity policies in all aspects of VET programmes in higher education.

The gender issues pertinent to networking of the stakeholders - VET institutions and industries in the implementation of gender-based WBL programmes include:

Funding of gender-based WBL initiatives by considering the extent to which students might be sponsored by their employers or subsidised through other financial arrangements. Having a common funding model for stability and continuity is crucial, and incentive grants could encourage compliance with the principles of gender-sensitive WBL.

Participating schools' and industries' issues regarding a cost-effective human resources development model. There should be clarification on attainable WBL objectives in order to avoid disappointments and for those who do take WBL as a valuable route for enhancing the holistic professional development of VET students.

Other gender-based WBL issues relating to the model are connected with achieving support and initiating capacity-building programmes, setting up mechanisms for monitoring and accountability. By adopting a regionally acceptable WBL model, Nigeria as well as other SSA countries would build the critical mass that could attract the funding of international development and expertise of international VET agencies.

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Salim Akoojee

▶ Work-based Learning in, and for, the Informal Economy: An African Perspective

1. Introduction

"Work-based learning" has become a significant component of the international discourse for enhancing school-to-work transitions. The concept widens the current understandings of school-to-work transitions and skills development systems. It provides a much-needed opportunity to bring into focus forms of learning that exist in various contexts and that have been neglected so far, especially as they relate to developing and transition economic contexts. The informal economy, and the learning within it, have not been incorporated as essential or significant elements of the economies of these countries. While the importance of this economy has been widely acknowledged, forms of learning associated with it still need to be accommodated in national education and training systems.

The predominance of a large informal economic sector in many parts of Africa and Asia suggests that a new perspective is required for advancing the post-school education and training and intermediate-level school-to-work transition systems in these contexts. It comprises more than 90 per cent of the regional economies in sub-Saharan Africa and East Asia (Walther, 2007) and, importantly, makes up almost 30 per cent (cf. Thai & Turkina, 2013) of the international economy,

This reality provides the basis for a new perspective for mid-level skills development. In contrast to current understandings of Technical and Vocational Education and Training (TVET), which have been crafted as a response to, and in preparation for, the formal industrial economy, the WBL alternative, while not neglecting this component of the economy, provides an important starting point for widening the ambit of mid-level skills development by incorporating, and advancing, learning forms in the informal economy.

The paper provides a brief overview of the nature, form and context of informal learning in the African context. It is argued that the notion of work-based learning can provide a powerful means to ensure that informal learning forms are embraced in the national space. It is argued that embracing this education and training "system" can advance national devel-

opment goals and resolve key socio-economic deficits in a context where there is a clearly a lack of formal employment opportunities being created by the private sector.

2. Advocating for change and advancing learning in the informal sector

Attention to learning for the informal sector in sub-Saharan Africa was given prominence after Haan's work (2006) which posited the view that apprenticeships are the most common form of non-academic training in sub-Saharan Africa. The work of the International Labour Organization (ILO) over the past 20 years has highlighted the role of training for the informal economy and much work has been done to enhance its significance in some contexts, i.e. Malawi, Zambia and Kenya. While the existence of the sector is unquestioned and much still needs to be understood about the nuances in the sector in order to advance its interests in a systemic way, advocates for its promotion have become more robust. For instance, the international community led by the International Monetary Fund (IMF) has been vocal about its impacts in "poor and emerging" economies and has called for its legitimation:

> … the informal sector has an important role to play, especially in developing economies where it may be viewed as the nursery of future economic growth in the formal economy. It serves as an important buffer against economic uncertainty and underdevelopment in the formal sector by providing livelihood to large segments of the population. (Singh et al., 2012, p. 42-45)

In Africa, recent calls for advancing learning in this sector have been particularly robust. The inter-country quality node (ICQN) Conference of the Association of the Development of Education in Africa (ADEA) held in 2014 conceded that the issue is less about simply advancing the informal sector than about the choices made regarding the developmental model:

> African economies too frequently operate according to a development model in which growth depends almost exclusively on the ever-greater presence of global companies. But current trends, reflecting the "third industrial revolution", underline the crucial role that other types of production unit (particularly in the informal economy) will play in the future as a source of innovation and new types of jobs and activities. This sector exists in all countries of the continent, but it is currently either ignored or neglected. (ADEA, 2014, p. 2)

There is increasing consensus that the sector can "create added value and (could be) the heart of socio-economic development strategies and policies" (ibid). Thus, ADEA recognised that the reality of young people having to transition into an informal economy is no reason for not providing them skills:

Just because the vast majority of young people enter informal employment, they are no less in need of training in order to perform properly the tasks entrusted to them. (ADEA, 2014, p. 3)

It is evident that training in this sector is subject to considerable variation, largely associated with the local contexts of its origin and its current form. The following section briefly outlines key features of its nature and form in Africa.

3. Understanding work-based learning in the informal economy

The notion of WBL has been described as one without a "commonly accepted definition". Not only do policymakers and researchers have different understandings of the concept, but they understand its practice in quite different ways. Defining it has become particularly crucial in light of its becoming "a research field parallel to TVET" and in light of the fact that it represents, "a powerful pedagogical approach which is embedded in general education (high schools and universities) and vocational education" (Sweet, 2013).

The most comprehensive political global consensus around the concept of work-based learning is provided by the Inter-Agency Group on Technical and Vocational Education and Training (IAG-TVET). The policy guideline leaflet entitled "Investing in Work-Based Learning" published in June 2017, points out that,

Work-based learning refers to all forms of learning that takes place in a real work environment. It provides individuals with the skills needed to successfully obtain and keep jobs and progress in their professional development.

Further clarification is obtained by the document's reference to "the common types of work-based learning, viz. apprenticeships, internships/traineeships and on-the-job training." In light of the consensus reached, the definitions provide an insightful starting point for understanding the concept and using it as a point of reference for understanding why, and how, learning is (to be) understood in the informal economy. The three essential forms include apprenticeships, traineeships (and internships) and on-the-job training). Each is described below:

(Apprenticeships)…. "provide occupational skills and typically *lead to a recognised qualification*. They combine learning in the workplace with school-based learning in a structured way. In most cases, apprenticeships last several years. Most often the apprentice is considered an employee and has a work contract and a salary."

"Traineeships and internships …are workplace training periods that complement formal or non-formal education and training programmes. They may last from a few days or weeks to months. They may or may not include a *work contract and payment.*"

> On-the-job training is described as "…training which takes place in the *normal work environment*. It is the most common type of work-based learning throughout an individual's working life." (IAG_TVET, 2017)

Each of these can be adapted to informal economies and training practices that pertain in these. Although it is generally understood that work-based learning is associated with the formal economy, most notably exemplified by the so-called "dual system" that originated in Germany, Switzerland and Austria, the need to incorporate informal learning forms still needs to be considered. Current reference to learning forms in the informal sector is incorporated in a notion of informal apprenticeship emphasised by the ILO (see for instance ILO, 2012). It is, however, important that work (and jobs) be understood more broadly to incorporate both formal and informal sector activity, and that the reference to "normal work environments" will include those associated with the informal economy. For these to be incorporated, it is important that some understanding be gained of current learning forms in the informal economy in Africa, as the following section outlines.

4. Known unknowns: Understanding the informal economy and learning, in and for the informal sector. Diversity between, and within contexts

Learning in the informal economy is crucially based on an understanding of what it comprises. In Africa, the share of people employed in this economic sector is considerable. Evidence available in eight sub-Saharan African countries suggests that at least eight in ten young workers are in informal employment (ILO, 2015b). ADEA's inter-country quality node conference (2014) indicated that "In most countries, the informal sector is large in comparison to the formal sector: it accounts for 80 to 98 % of people in work" (ADEA, 2014, p. 2), with not inconsiderable impact on GDP[1]. While there are regional nuances,[2] it is clear that informal sector employment tends to be the first job for most young people in the continent. The biggest challenge of course is related to its current lack of acknowledgment of its existence, as being, "…either ignored or neglected. (ADEA, 2014, p. 2).

There are a number of "known unknowns" in the informal economy and learning within it, with widespread generalisations made about its current form. While much is known about the extensive nature of the informal economic sector, relatively little is understood about training in, and for, this sector.

In general, it is agreed that most training is associated with a form of apprenticeship provided by small enterprises, sometimes for a fee, and results in self-employment rather than

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1   As pointed at the ADEA conference, "In some countries they produce up to 70% of GDP, and in many they employ between 75% and 90% of young jobseekers (for example, 90% in Benin, 86% in Ghana, 80% in Kenya and 87% in Zimbabwe)" (ADEA, 2014, p. 2)

2   Informal employment is lower in southern Africa, where it ranges from a low of 32.7 per cent in South Africa to 43.9 per cent in Namibia, than in other parts where it accounts for between 80 and 98 per cent.

waged jobs. Existing information strongly suggests that it is associated with a range of national, regional, and local contexts. Its form and character are likely to have been profoundly influenced by the local circumstances in which it evolved. Earlier work speculated that, "Within sub-Saharan Africa, quantitative information on apprenticeships is most abundant for Ghana, where informal apprenticeship is the most important source of training in the urban economy" (Haan, 2006). Since these early days, more evidence has become available regarding its nature, form and context.

The spectrum of economic activity ranges from conventional local home-based activities including vending of food and small merchandise to providing health products and care (traditional healers), and from tailoring of garments to more expansive furniture manufacturing and automobile repair. The extent of the sector in the more central regions of the continent (i.e. Nigeria, Senegal and Kenya) is associated with significant innovation in manufacturing in comparison with a more retail-associated activity dominant further into the south of the continent. However, the informal (illegal) extractive sector in underground mining activity that exists in South Africa and the legal fishing activity in the lakes of Malawi differ significantly in the way they have originated, are currently understood by local authorities and responded to in the national space. The widespread nature of their presence, in both urban and rural contexts, define their character. Their predominant presence in high-density commercially operative retail activity in urban areas is contrasted with their diverse occurrence in quite innovative agri-based activities in rural contexts (e.g. in areas of manufacture)[3]. Skills responses are importantly shaped by these factors within the terms of the peculiar national regulatory context.

Learning in this sector is also affected by the different kinds of entrepreneur types that have been identified. In Zambia, for instance, the informal economy is dominated by micro, small and medium enterprises (MSMEs), with most of these businesses (92 per cent) often functioning with only one operator (Conway & Shah, 2010). Many of these are family-based with little in the way of cash transfers changing hands, while only 12 per cent of MSMEs are "entrepreneur" firms, employing workers who are paid solely in cash. Here, the vast majority of MSMEs are concentrated in the agricultural sector (70 per cent), with most of the remainder in the retail sector (21 per cent) (ibid.). Another important characteristic of the informal labour market is its strong gender bias: in the developing world, a high proportion of women in the active labour force are in the informal sector. In SSA, this share is even higher (Steel & Snodgrass, 2008; CSO, 2011) and according to Chen et al. (2007) and Chen (2008), women are concentrated in the more precarious types of informal employment, where the average earnings are found to be "too low...to (even) raise households out of poverty" (Benjamin & Mbaye, 2014, p. 6).

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3   For instance, the "new" agri-activity for the commercial production of pounded yam flour in Nigeria by small-scale informal entrepreneurs.

It is contended that while governments are increasingly required to firstly acknowledge the informal sector's existence and reiterate its importance to the national economy before they are able to attend to the welfare of those employed therein, learning in this sector also has to be incorporated in national systems if they are to be inclusive of the various types of economic activity that are in existence.

5. Conclusion: Still some way to go and some crucial questions to be answered

The call for engagement with this education and training form is based on the conception of development; a linear notion of development assuming that those which have a large formal economy are necessarily superior to those which do not. In this regard, the overall need to formalise informal sector activity (and learning within it) is an important starting point for its overall improvement. Nothing is further removed from the current reality. It is argued that improving learning and training in this sector will provide important linkages with the formal economy, and might well assist in legitimising a sector largely considered outside of the norm.

While it is agreed that there is a need to improve work-contexts in this sector, there is no single panacea which could resolve its various deficits. A combination of approaches and interventions may be required to improve the quality of training, the level of skills acquired, the working conditions and the level of access, especially to foster greater employability beyond the local community, including young women's access to non-traditional occupations. It is crucial that such provision builds on existing learning practices in the informal economy and does not drive out existing practice from which its essential effectiveness derives. Policy proposals that focus on complementing efforts to expand the formal TVET system and other initiatives to improve national skills development systems (ILO, 2012, Foreword), will provide a sound basis for its improvement.

Some issues and questions that need to be addressed:

▶ Do we need to rethink the notion of "formal" and "informal" apprenticeships? Does the notion of informal apprenticeship invariably suggest a model that is "less rigorous"? And if so, what are the implications for its advancement?

▶ The nature of the strength of apprenticeships in the informal sector. Merging learning and work and work in the learning context. Is this a conceptually unique phenomenon or a conventional practice "unworthy" of serious engagement except for identifying challenges?

▶ We need to improve it by bringing it into the ambit of the formal system. Is this a meaningful, yet tentative, response? What notion of formality do we have? Is it based on existing systems in these contexts, and if so, to what extent are these "good enough" to be replicated?

▶ The issue of understanding the nature of the informal sector has been adequately acknowledged. How do we not destroy the essence, and value, of what is already there and "working for purpose" with regard to work-based learning?

▶ Are existing apprenticeships in this sector competency-based? Is competency about recognition or quality? If recognition, what would be the purpose? And if quality, what is the way to ensure success and legitimacy?

▶ The informational challenge: do we really know what happens in these "learning" and "work-places/spaces? The challenge of appropriate methodology and "gross" generalisations that obfuscate, rather than illuminate, what is really happening in the sector.

The response to learning in, and for, the informal economy is not unrelated to the general need for national governments to respond to learning in different contexts. In the case of the informal economy, the need to understand the peculiarities of this sector is significant, as described in the following quote:

> Instead of a unitary theory of disease that yields a single remedy for all ailments, a quest allopathic medicine abandoned long ago, informal economy researchers have to tailor their policy prescriptions to the specific causal scenarios in different places. This requirement makes one-size-fits-all policy recommendations hard to craft and unsafe to implement. The right course, of course, is […] hard work, sensitivity to detail and location-specific research (Ivan Light, 2013, p. xv).

While we can take some comfort that we have moved on considerably from the quite suggestive insinuation of the question, "Is informal normal?" (OECD, 2009), we still have some way to go before we accept that the skill development and apprenticeship forms in this sector are indeed significant. We might well need to step back and explore uniqueness and difference by engaging with this education and training form to learn what works, expanding and supporting "best practice" with due regard to contextual considerations, before simply assuming that all practices need to be improved and that the most effective and efficient manner to do this is by incorporating them in existing formal systems. The current work-based learning discourse, which must take current practices as a starting point, suggests that it can be used as an important element in the overall improvement of learning in, and for, the informal economy. Work-based learning can, therefore, provide the necessary legitimation for the advancement of informal sector learning forms, and makes a powerful case for its incorporation into national education and training systems.

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Part IV:
The Role of Tutors, Fellow Workers and Instructors in Work-based Learning

Claudia Jacinto and José Pozzer

▶ Work-based Learning as a Concept "under construction": Evidence from two Internship Schemes in Argentina

1. Introduction

With a background of a mainly school and university-based education system (only around 20% of students attend technical education),[1] Argentina has lately started to promote policies that include work-based learning (WBL).[2] WBL has been the subject of debates and new legislation. Previously there were few precedents and the country had almost no tradition in this learning modality. In fact, in the middle of the thirties of the last century, an apprenticeship system was created addressing young persons who worked and attended supplementary training courses. The promoters of these were the employers' associations. But apprenticeship was a minor practice that became less common after the 1950s. It was only in the 1990s that internships were introduced into vocational training courses for unemployed young people (as a part of youth transition programmes) and in secondary education institutions (not compulsory but optionally).

The ups and downs and unexpected turns in the course of this development were due to the fact that it occurred in a context of disputes among the stakeholders in the world of work, i.e. businesses, unions and government. Indeed, the legal framework and experiences relating to work-based learning as part of the educational process, particularly in secondary education, were far from being a matter of consensus. The debates circled around two main arguments: The first relates to the issue of child labour. As the legal age for children to enter the world of work increased, it became questionable whether students below this age could participate in such internships. (By the mid-1940s the legal minimum age for working was 14 years; in the 1990s it was raised to 16 years.) A second argument was the resistance of

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1   This forms part of a long-standing debate: the ministries of education tend to favour general education over professional training (Wallenborn & Heyneman, 2009).

2   In this article, we will conceive WBL as an educational strategy that provides students with authentic work experiences where they can apply academic and technical skills and develop employability skills.

trade unions, which considered internships as a risk that could result in the substitution of workers with interns. In the case of work-based learning as an element of youth transition programmes, these were short *ad hoc* programmes.[3] As a result, the scope of these experiences was small. Only few companies in the country have entered into sustainable internship arrangements with technical secondary schools and/or participated in youth transition programmes.

In the middle of the 2000s, with the recovery of the economy, an increased demand for skilled workers for industry became apparent. Not only was there an insufficient supply of technical workers, but also their skill sets in many cases were no longer suited to the needs of the world of work (do Pico, 2013). At the same time, youth unemployment and precarious employment were high. These were frequently linked with the low skills in those who had not completed compulsory education. In fact, even nowadays only 66% of students finish secondary compulsory education (12–17/18 years old) in due time. Young people continue to be the age-group with the highest labour informality rates: 59% compared to 35% of the active population as a whole. Thus, social and active employment policies addressed to these youth became an important political issue.

In this framework, since the 2000s, new laws have been established that address both technical and professional education as well as university internships and vocational training. Other decrees regulate the system of practices in companies at the secondary educational level. At the same time, as part of active employment policies, programmes are established that promote work-based learning aimed at vulnerable young people.

Currently, the WBL policies addressed to young people focus upon two types of programmes:

a) internships related to secondary technical schools (through the model known as "*vocational practicums*" (VP) *(prácticas profesionalizantes)* consisting in a specific number of hours in companies as part of the technical education and vocational training
b) the "*on-the-job training*" (OJT) model *(entrenamiento en el trabajo),* linked with youth transition programmes encouraged by the Ministry of Labour.

In this context, some central questions concerning WBL have moved onto the public agenda, namely how to consolidate a system of technical and vocational education and training where work-based learning could be developed and institutionalised, and how to create a "culture" that valorises this component and involves the key stakeholders at different implementation levels.

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3   The programme *Proyecto Joven* (the "Youth Project") was funded by the Inter-American Development Bank and included a school-based "demand driven" training during three months, combined with three months of work-based learning (Moura Castro, & Verdisco, 2002). However, the programme was operated during a period of massive increase in unemployment figures. Consequently, it did not succeed in integrating young people into formal employment (Devia, 2003). The programme finished at the end of the 1990s, and it was only in 2008 that a new youth transition policy was installed.

This paper analyses the implementation process and challenges faced by these two types of WBL linked to youth initial training in Argentina.[4] Since both types are public WBL policies, they encounter many demanding issues in implementation, as regards the regulations, the financing, the decentralisation procedures, the place of different stakeholders, and the learning elements, including the profiles and roles of tutors involved in each model.

To gain a better knowledge of the challenges in both schemes was the main purpose of our on-going exploratory study, which is the basis of some of the findings discussed in this paper. The study was based on a qualitative methodology including: a) an analysis of the historical background of WBL in Argentina to show advances and setbacks in its implementation; b) a document analysis (laws, decrees and resolutions organising the management of the two new WBL models; management reports from the handbook prepared by the Argentine Business Association (ABA) to provide guidance for companies); and c) qualitative field-work including interviews with stakeholders involved in both models. The field work has taken place in two provinces: Buenos Aires, Chaco and Corrientes. As informants related to the field of education, interviews were conducted with three provincial or regional authorities in charge of the general management of the training system and three of the school tutors in charge of managing the VP. As informants related to the field of labour, for VP, interviewees included two members of the School/Company Programme of the Argentine Business Association, three referrals from the Human Resources areas and three company tutors (from one large and two medium-sized companies); and for OJT: two heads of local Employment Services were interviewed, as well as two Human Resources area managers, and three company tutors (from one large, one medium-sized and one small company) who implemented the model. In short, the total number of interviews was 21.

The article is structured in three parts. First, the characteristics of the two models are presented, comparing one with the other. Second, tensions and challenges in the implementation process are discussed. Third, some findings about the nature and challenges of the role of tutors at schools and in workplaces are revealed. As a conclusion, some reflections and recommendations about the construction of work-based learning models in Argentina are proposed.

2. The two work-based learning models: similarities and differences

The first model is based on a new law on technical education enacted in 2005. It increased the number of years and hours of training required, reorganised the diplomas and ensured financing. It expanded the concept of internships, creating *"vocational practicums"* as a part of the curricula of secondary technical school education (which lasts 6/7 years – including theory and practice-based courses). These internships consist of 200 hours of compulsory

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4   Another important type of internship in the country is addressed to university students. It is frequently the way in which they are hired for their first jobs. The focus of this paper, however, will be on WBL linked to initial training only.

practical training outside the school, which includes both a phase of actual practice and a phase of observation and reflection on the practicum. One option for *vocational practicums* is a period of work-based learning in a company, NGO or public agency. In this model, WBL is conceived of as a useful complement to the theoretical and practical training offered by the schools. It is assumed that they will introduce students to the routines and rituals of a real workplace and to the professional codes, values and norms of an occupation and an employment setting. The *vocational practicums* take place in the student's seventh and final year of secondary technical education.

Being responsible for the management of *vocational practicums*, schools have created a new role, "the tutor", who is also responsible for getting in touch with companies and finding the placements. In these tasks, schools are supported by middle-ranked education authorities (supervisors) and by the provincial management. So far, companies with previous experience of internships have evidenced a greater openness and understanding of the model and its purpose. The rest of the business community, ranging from business associations to the companies themselves, has little knowledge of the system.[5]

The second model, named *on-the-job training*, was created in 2008 as part of a Youth Transition Programme addressed to unemployed youngsters up to the age of 24 years. The programme is managed by the Ministry of Labour. It aims at training competencies and skills while the young people perform in real jobs. It consists of theoretical and practical training, emphasising the latter, in the workplace. The period of on-the-job training can last between 160 hours and 480 hours according to the complexity of the task in question. The participants receive a monetary incentive. Prior to their placement in the company, young people receive brief introductory training by way of guidance to the world of work. In this model, work-based learning is an element of a social policy approach targeted at providing disadvantaged youth with more opportunities to enter formal employment.

One of the directly responsible parties in *on-the-job training* are the employment services, who receive youth and, after a guidance period, reassign them to available positions. The staff look for the placements in companies. Sectorial unions have a greater say over this model, basically due to the fact that young people joining the programme are older and the training period is longer; this action is seen as risking the substitution of workers.

As relatively new arrives, both instruments are under a continual social construction process; their implementation is full of new challenges both as to the regulatory framework and the involvement of stakeholders is concerned (government at different levels, unions, companies). Critical issues for the achievement of quality in work-based learning are still far from being considered, such as the evaluation of internships, the development of monitoring tools, etc.

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5   There is an exception: in the case of the province of Buenos Aires, the Argentine Business Association has assumed a supporting role in the creation of linkages with companies and in technical issues. Specifically, a guide to implementing training on the job was developed for associated companies. This document was prepared by education authorities and the Association.

Table 1 shows similarities and differences between both models, according to their scopes and regulations, learning subjects addressed in each model, and their durations.

Table 1: The two forms of work-based learning: general similarities and differences		
	Secondary technical education *Vocational practicums*	**Youth transition programme** *On-the-job training*
Scope	Regulated by laws at national and provincial level	Governmental regulations linked to the creation of the youth transition programme
National Authority	Ministry of Education	Ministry of Labour
Forms	Compulsive VP as a part of the last year of secondary TVET. It is promoted that the VP are done in companies, though they may take other formats	Transition programme for disadvantaged young people to enter formal employment
Length of work-based activities	Minimum 200 h	Minimum 160 h/maximum 480 h.
Learning subject	Students in the last year of the secondary technical schools. 17 to 19 years old.	Unemployed or informally employed youths aged 18-24

The learning subject is quite different: while the first scheme represents an educational format addressed to students in the last year of secondary school, the second is focused on unemployed youth and/or young people in informal employment, that may or may not have finished secondary education. Three factors clearly differentiate the profile of the young people that access each type of work-based learning: their age (in-school adolescents in the first case and out-of-school young people in the second), their previous work experience and their social and economic backgrounds. In connection with age, some companies interviewed by us mention that hiring adolescents causes a serious concern with regard to "the risks" in the workplace. With respect to work experience, while it is probable that participants enrolled in *vocational practicums* have not yet had a job or have only had minor jobs in the short time available when they were not attending school, those in the second group, by definition, have already had some experience in the precarious and unstable world of employment. Some companies consider this greater experience an advantage, since the young people have undergone a previous socialisation process where they acquired the basic skills of organisation in the job. However, the fact that youth within the *on-the-job training scheme* come from low-income households, lack experience in formal jobs and in many cases have not finished secondary education, represents a basic profile that *a priori* places them in unqualified positions and far from the general, social, and emotional skills sought by executives for a medium qualified position. In contrast, adolescents who are finishing technical education have

already demonstrated their competences to remain at school and finish their compulsory education, and have a more specific training to hold medium qualification positions. Hence, their social and educational profiles seem to be the key point of distinction between them and concerning the sense it makes for particular working environments to hire trainees on placement.

Table 2 shows the elements of work-based learning in the two schemes.

Table 2: Work-based learning elements		
	Technical education *Vocational practicums*	**Youth transition programme** *On-the-job training*
Learning venues	School-Companies. Large and SMEs	SMEs
Learning target	On-the-job experience complementing practical skills developed at schools workshops. Technical hard and soft skills	On-the-job-experience oriented to employability. Very specific technical skills and soft skills
Learning method and context	Participating on a specific work task or activity. Discussion at school sharing experiences	Participating on a specific work task or activity
Learning assessment	The school is in charge of the evaluation of the student.	The company is in charge of the evaluation of the trainee.
Financial incentive received by the young people	No incentive. Only a per-diem for transportation/ feeding, depending on the company. Work insurance paid by the regional authority	Fixed amount paid by the government and the company. Companies pay health and work insurance

As the table shows, both models differ significantly with regard to their learning elements. In the first case, the purpose is to provide training closer to the world of work for students in technical education: technical skills should be put at stake when dealing with the solution of concrete problems in a working environment. In the second case, the purpose is to seek training-on-the-job opportunities for low-rated youth; the emphasis is placed on specific skills, enticing labour socialisation processes and increasing employability in formal jobs. As will be discussed in the following, assessment is still a big challenge in both models. The assessment stage may have different implications: in a *vocational practicum* these range from the approval of the syllabuses to the possibility for the trainee to be included on an internal jobs board for a future vacancy. In *on-the-job training*, if the company had the intention to take on

personnel, it might mean subsequently being hired or at least the possibility of being included in an applicant database for future vacancies.

A common factor is that both models are part of public education or employment policies where the core initiative falls on the State. Both initiatives are based on regulations that protect the "student" status of trainees, not only with respect to labour insurance, but also to established working hours and environment. But in order to participate, companies have to comply with different requirements: only in the case of *on-the-job training*, companies that have been sanctioned after inspections of the Ministry of Labour or have undergone massive layoffs during the last six months are excluded.

Taking into account their similarities and differences, which challenges of implementation have been recorded in the field-work so far?

3. Challenges of implementing the two models

Research literature shows that the learning quality achieved in WBL is strongly related to the companies' training management. This means responding to questions such as how the work is structured and allocated to novices, and what kind of support and feedback trainees receive from co-workers and mentors (ETF, 2012). This implies "translating a working position into a training position" (Marhuenda, 2000). At the current stage of development of these reviewed instruments, these questions have, for now, only initial responses. Rather, concerns are focused on the organisation of placements and management of the trainees.

3.1. Tensions/challenges detected in the implementation of vocational practicums

a) National and provincial governments must solve legal issues (for example, set the legal labour provisions for the role of the "workplace trainee") and bureaucratic issues (organising the whole administrative system of articulation, follow-up and control) to establish the system throughout the provinces. It was not until 2013 that the system started to be implemented in some provinces. As one interviewee said:

> There was a lack of regulation for schools to enter into agreements directly with companies; we had to create them because if everything was centralised, there would be no flexibility.

b) Since *vocational practicums* are compulsory to obtain the vocational training certificate, this encourages the players in the education system to create possibilities for completing this training in settings other than companies. There is more emphasis on meeting the obligation of providing placements than on the quality control of what the students learn during the training. Creating the relationship structure with organisations means appointing an institutional representative to start visiting companies and "convincing" them. All this is a handmade process operating at different levels; from provincial authorities sign-

ing agreements with big companies (there is a provincial council where stakeholders from both the world of work and the world of education should meet), up to school supervisors and school tutors promoting local connections, especially with small and medium-sized companies.

c) As long as those supports are not institutionalised, many schools with no previous experience in organising internships are unaware of the mechanisms, steps and supports necessary to carry out the search for in-company training. Instruments such as the handbook recently developed by the provincial education agency and a business association provide resources that may be valuable for guidance and information purposes.

d) Some sectors are particularly complex as workplaces for potential training placements, such as the construction sector (due to the risks entailed by the activity) and ICT (due to the typical development forms of the activity, even though it is a growing sector). As an example of this, and of the alternative strategies that need to be pursued, there was the case of an ICT company that provides services to other companies. Students were organised in groups that did not work on-site at the company, but rather off-site, developing an HTML solution to a real-life problem, with continuous support from the company.

e) Student learning assessment is still weak. On the one hand, the school is formally responsible for evaluating the student's performance, but as yet, the extent to which this evaluation should be a collaborative process with the company has not been fully specified. This is brought up by a key informant:

> Education authorities do not reach the stage of controlling whether VPs were good or not. If the school is good, training is good, but if the school is deficient in developing the instrument, the quality cannot be ensured even though the company is good; it depends on the school.

In addition, there is mistrust and fear in the education system because *vocational practicum* management reveals some limitations of the very offer of technical education. How many specialisations are actually correlated with the real work that students encounter in the workplace? And if they do not get any training, does it mean that they will have no job after graduation? This is especially critical for technical schools with a specialisation in contexts where there are clearly no companies requesting that knowledge.

In spite of these limitations, reported experiences show that once there is some initial experience with internships, the system starts operating and a great value is attached to the learning process of the student. As expressed by a human resources manager at a company,

> the training provided includes technical education, but also incorporates a strong component of personal and social skills development. Vocational practicums are far from being merely "on-the-job training"; they also have a strong capacity-building element, which is intended not only to complement the practical training provided, but also to address deficiencies identified in school-based technical training.

Sometimes, businesses are motivated to take on student interns who may have an impact on the organisation of the company's own work groups. This was the case in a Japanese automobile company, which proposed that interns should be mentored by the supervisors of company work teams, thus enabling those supervisors to develop new leadership skills and teaching abilities.

These signs that WBL is beginning to be recognised and valued in the business world seem to be consistent with research literature about the importance of the employer's support and commitment.

3.2. Challenges reported in the case of on-the-job training

As *on-the-job training* is only one of several options for young people participating in the youth transition programme, most of them were referred to vocational training in educational environments and not to *on-the-job training*. This is because the challenges in the organisation of WBL are greater, and because finding business placements for the low-rated youth and low-income sector is rather complicated. In fact, the respective interview partners declared that the only young people belonging to the programme and referred to WBL were the ones whose profiles were most attractive for executives.

Concerning the local employment offices that should manage the model, there are difficulties at various levels.

a) Having the physical and human resources to meet sizeable demand from youth participating in the programme.
b) Having well-trained human resources available to identify organisations and establish a solid relationship with them; there are not enough positions for training in the private sector.
c) Establishing agreements with the organisations. Apart from the above-mentioned structural weakness of employment services, another reason is associated specifically with the mistrust generated by the Ministry of Labour among entrepreneurs due to its labour inspection role. Companies also complain about the overload of administrative and bureaucratic tasks that their participation would entail, and a major lack of information about the programme was observed.
d) Defining the profiles of the training positions and those of young people to be referred, to adjust them to the expectations of the applicant organisations.
e) Carrying out a follow-up during the training period. Mentoring is limited to the intermediation stage, when the Youth Transition Programme starts and is under the responsibility of the company.

Concerning the companies, it has been reported that they may put the programme to many different uses, and these determine whether learning conditions are favourable or not so favourable:

a) For some companies, *on-the-job training* is a resource to obtain a workforce that allows them to give a temporarily rapid and economic response to the expansion of demand. But this does not mean that they emphasise the learning achievement of youth.

b) For other companies, the *on-the-job training* is used as a trial period to assess performance before making the final offer of employment. This may constitute a good learning environment.

c) On certain occasions, reasons to participate are related more to corporate social responsibility than to the development of human resources. This may weaken the genuine interest of the organisation in training young people.

d) In the case of a start-up, *on-the-job training* provides a useful resource that allows the company to go through its launch stage without incurring employment commitments.

e) For micro, small and medium-sized companies, their limited levels of organisational development make it difficult to create qualifying environments. *On-the-job training* is primarily carried out in the context of low-complexity operational tasks, but ensuring that training takes place in formal companies is not a minor issue.

4. The role of tutors and mentors in both models

Literature on WBL talks about the central role played by the availability of good trainers and mentors in the workplace for the overall quality and success of WBL (Masdonati & Lamamra, 2009). Finding the right people is particularly difficult in the case of micro- or very small enterprises.

A particular characteristic of both models in the Argentine case is that they propose the involvement of two tutors. In the *vocational practicum*, a tutor is responsible on behalf of the school and another one on behalf of the company. Meanwhile, the role of tutors is different in both schemes. While in the *vocational practicum* the greater responsibility falls upon the educational tutor from the school, in *on-the-job training* the responsibility falls to companies, both with regard to the work plan and to the tutoring. However, in both cases, the plan is discussed or at least agreed upon between the State official and the company or the tutor. Plans are similar and describe the trainees' tasks in their position or in the different positions previewed.

The school tutor is a teacher in charge of *vocational practicums*. His responsibilities include, among others, seeking and making contact with companies to carry out *vocational practicums*, organising an activity plan, and maintaining a link with and follow-up of students at the company. He is the one who assesses and grades the *vocational practicums* as a syllabus.

The assessment is quite informal for the time being, but is intended to become more organised using resources such as the Argentine Business Association guide. This guide includes indicators and the trainee's level of assessment in terms of theoretical knowledge, practical and cognitive skills (equipment operation, solving production problems, etc.) and

attitudes (autonomy, initiative, collaboration and teamwork, assistance and punctuality, responsibility and interest in work).

The criteria of school tutors' selection are: that they have a connection to the specialisation area and that they have personal work experience in the sector. The company tutor is an employee who is responsible for the trainee in the workplace. The following figure[6] shows where tutors are in the management structure and describes their roles in the *vocational practicum*.


Figure 1: The structure of tutoring in the VET model
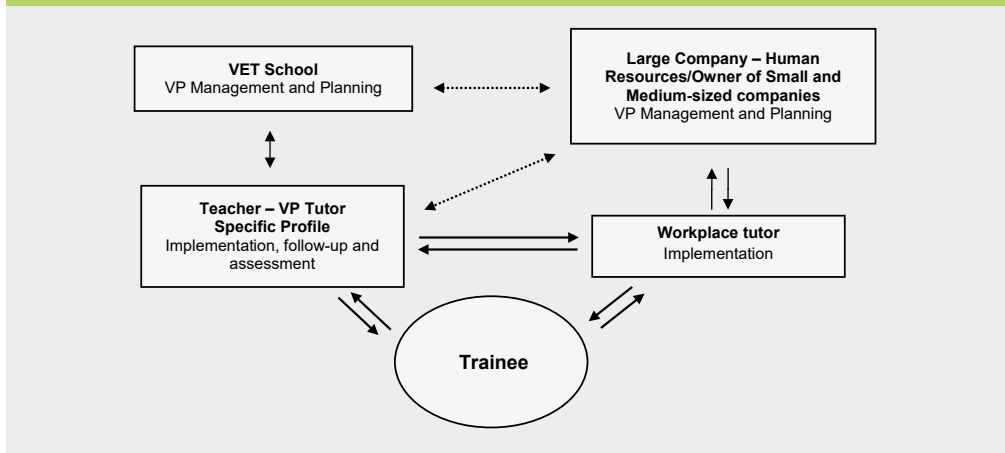
In *on-the-job training*, tutoring appears to be related to the youth guidance process and follow-up that should be carried out by the employment office. The role of the workplace tutor includes verification of activities and follow-up of the experience of young people in the company. The employment office staff responsible for these tasks may or may not have a specific training profile. As was mentioned, in many instances the mentoring support and follow-up can be inhibited by the diversity of tasks of these public agents (involving different types of beneficiaries; registration and loading of employment records in platforms; benefits guidance; search for profiles; relationship with companies, etc.). Figure 2 shows this structure.

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6   In the figures, the connecting arrows show the intensity and permanence of the bond between actors during the WBL process. The full arrows mean a permanent linkage during the process and the dotted arrows mean an initial and discontinuous linkage, difficult to maintain during the process. The double arrows stand for the stronger linkages in the tutoring process.

Figure 2: The structure of tutoring in the OJT model
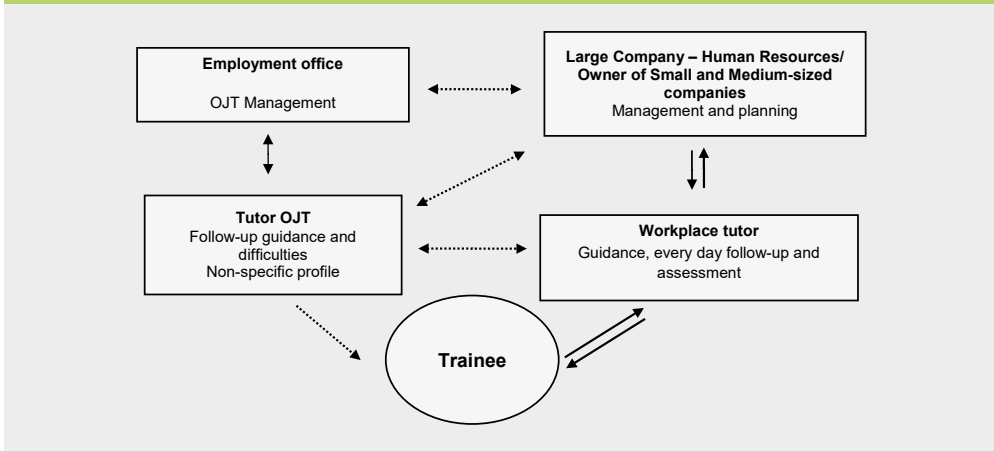
On the part of companies, the mentoring role shows similar characteristics in both models. The assignment of interns and the mentoring role is associated with a hierarchical responsibility; tutors are section managers. This is a part-time activity; the mentoring-training role is added to the daily activities performed in their positions.

Depending on the company size, some peculiarities may be observed. In large and medium-sized companies, when there is a Human Resources department, it assumes a linking role between schools or employment services; it manages that link and supports the trainer. The internal support to tutors is reflected in their involvement at the time of selection, induction and follow-up of the interns' activities, using strategies that have to do with evaluation, adaptation to work and to the company, review of personal interests, etc. In small companies, the whole process is usually under the responsibility of the entrepreneur-owner, who only oversees and controls the work done.

In general, the trainee's learning process is developed in the position at work, while it is the tutor who transmits the knowledge necessary to perform the activities. The tutor-trainee relationship involves indication of the tasks to be performed, review and feedback in terms of adjustment to the task performed; their direct link is supported by sharing a working space. This result matches research background that stresses the importance of the interpersonal relationship both for the transmission of knowledge and for the quality of the school-to-work transition (Masdonati & Lamamra, 2009).

In every case, company tutors are selected according to certain profiles. The following characteristics are emphasised:

a) Attitudes/experiences and personal background. When the implementation of training placements is managed within the Human Resources department, it is usual to consid-

er certain characteristics of those responsible for the working areas, identifying in themselves those aspects that may be useful for accompanying the apprentices:

> he's a life fighter, he had to struggle in life and managed and I thought he would have a good profile to host children"; "they are people who have already experienced this system, everyone responsible for the areas where trainees are working, at some point they were also trainees.

b) Competencies and skills for guidance. Apart from previous career pathways/one's personal biography, some necessary attributes are also considered helpful in order to accompany and support a learning process in the workplace:

> know how to teach, know how to transmit, communication is essential in the moment I am teaching an activity, know how to transmit, and, if necessary, repeat it once and again, be a flexible person and open to change.

Although in some companies, calls for tutor positions are open, in others they seem to be addressed to section managers, who show some of the above mentioned attributes. This is mostly observed in *vocational practicums,* where training areas are not always considered based on the needs of a particular working area, but based on having someone available ("the tutor") who is equipped to accompany the process. Instead, in *on-the-job-training* the internship is frequently used as a way to build experience in the short term and to have a new worker; thus the area requesting the need is more important than the characteristics of the potential tutor. A woman working at a small company offering *on-the-job training* said, about the appointment of tutors:

> the truth is there are no options about who will be the tutor; there was only one person in the sales department and the apprentice came to collaborate with that person. Naturally, the area manager was the one who accompanied the process.

With respect to the relationship between the two types of tutors involved, in *vocational practicums*, experiences are observed where the schoolteacher and his company peer create spaces for dialogue and joint work. The teacher accompanies the training (with periodic visits), does the follow-up and review of the activity plan, receives the company assessments and gives support by developing content when necessary. This type of activity is not observed in *on-the-job training*. Here, the employment service and its "guide" do not maintain a relationship with the trainee on placement, and the whole training, support and assessment process lies on the company tutor.

The training process in both cases shows that the tutor, throughout the placement, offers increasingly sizeable tasks and gives greater responsibilities as long as the trainee responds and satisfactorily completes the tasks assigned. According to a company tutor:

you do not have much time, but you may see how the person evolves (…), the method we adopt is the progressive assignment of tasks and see how it works, for example, the one who is now in administration has to check stock movements against invoices, against the daily invoicing or against delivery notes and this is his task; routine tasks are assigned, but he is responsible for them. There is an increasing responsibility as the tasks are being assigned and we see how he complies with them.

5. Final reflections

Both models face a poor national tradition around an "internship culture" compared with other countries, and those with strong dual systems in particular. Historical ups and downs have shown resistance from every stakeholder in the world of work and the world of education as to its implementation:

▶ unions, arguing that it is a way to substitute workers;

▶ companies, considering that it is both a loss of time and a safety risk;

▶ schools, arguing that it is a supplementary task to be added to the principals' already overloaded daily agenda;

▶ local employment services, because of their recently created activity (6 or 7 years) and the precarious employment conditions of technical staff at the offices.

Vocational practicums are imbued with an educational logic, and creating bridges with companies can be a difficult task. But the pros are that it is a currently compulsory and valued mechanism; that a specific position has been created in technical schools to organise VP; and that young students' profiles may potentially be of interest to productive companies as future workers.

On-the-job training appears to be closer to a labour logic, with an emphasis on intermediation between young people and companies for job-placement. The model shows more shortcomings in support, but the young people's profiles (due to their weak formal education and poor life conditions) may adjust to low-rated positions in formal employment.

The study reveals differing degrees of institutionalisation in both models. While educational *vocational practicums* are ruled by laws and are compulsory (though not necessarily carried out in companies, work-based learning prevails), *on-the-job training* placements are only a part of a youth transition programme which, by definition, may be ephemeral. In fact, although in both cases the models were initiated by the national level, in the case of *vocational practicums* they are based on a law that changes the structure of technical education; instead, the other model is one that might change more easily. It can be said that the *vocational practicums* are in a process of institutionalisation, but the current efforts are not yet directed towards the quality of the learning process as such, but rather the organisation of

the system. By contrast, the second model is not highly structured. Monitoring depends on the specific case, but as the follow-up is a very important component of quality, the latter is not yet assured.

This short background to the implementation of both systems clearly shows that there is still a long way to go. From the recommendations standpoint, it seems to be evident that a critical core hinges on the relationship with the quality side of the world of work. There is a need to address an active clarification and sensitisation in the entrepreneurial and union sectors, so that they understand the models and start a feedback process which, in turn, facilitates their implementation. All the background and early experiences, which have been well considered by the interview partners, show that the involvement and interest of the organisations is a key issue for the quality of WBL.

As to the role of tutors in the organisations, their role for supporting learning seems to be key. The recent implementation seems to be a process of trial and error that needs further systematisation, training of future tutors (so as not leaving everything to certain personal characteristics of the individual, but providing support by developing other tools), and also the recognition (not solely in economic terms) of this position within the organisations.

It is surprising that the two models are not in a mutual dialogue, which may be seen not only at a national level, but also at provincial or local levels. Since schools report to the provincial governments, they coordinate *vocational practicums* and adapt the national model to the provincial territory. The provincial system provides orientation and human resources to make them operational. However, in the *on-the-job training* model, the programme depends on the Ministry of Labour, while local employment services are the ones responsible for managing the on-the-job training period. The management structures work in parallel and, if anything, compete to achieve a position in WBL. Depending on different public authorities, one of them belonging to the field of education policy and the other in the field of employment and social policies, each model is establishing its own linkages with the other social actors, mainly with the companies, and eventually with the unions.

But it is evident that the articulation of both models in an integrated system supporting youth labour transitions would potentiate the resources and strengthen stakeholder participation and youth opportunities.

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Anke Bahl

▶ Workplace Training as a Social Practice: How Trainers Experience the Structural Dynamics of German Apprenticeship

1. Introduction

Since learning opportunities in the workplace depend on both the organisation of work and good relationships, growing attention in the global skills debate is given to the role and contribution of formal and informal in-company trainers. How to raise the attractiveness of their job and improve their competences to meet changing labour market demands have become major issues of concern (Hoeckel, 2007, p. 3; OECD, 2011). In the case of the European Union, the Copenhagen Process on enhanced European Cooperation in Vocational Education and Training (VET) launched in 2002 describes VET trainers together with VET teachers as key actors in all strategies targeted at stimulating the development of society and the economy. It is assumed that their roles will change in a knowledge society and that they need particular support as they respond to these challenges in the perspective of lifelong learning. Member states agreed to raise the attractiveness of the respective professions and to improve their initial and continuing training by 2020 (Bruges Communiqué 2010, p. 8).

Yet who in fact belongs to the sub-group of VET trainers involved in work-based learning? While focusing on initial vocational education and training and apprenticeship schemes in Germany in particular, who are these trainers and what is their professional profile? Compared to most countries in Europe and around the globe, Germany with its historically long-rooted VET regulations and its dual training system at school and in enterprises usually stands out. Abroad, German VET teachers and trainers count as highly qualified, and the German qualification standard for trainers in enterprises – laid down in the Trainer Aptitude Regulation (*Ausbilder-Eignungsverordnung*) as early as 1972 and revised for the last time in 2009 – increasingly enjoys the reputation of a quality seal for work-based learning 'made in Germany'. From a national point of view, however, German VET policy faces on-going challenges in this regard. In spite of many initiatives and projects targeted at the profession-

alisation of trainers in enterprises beyond this minimum standard[1] since 1972, including the national amendment of two advanced vocational qualifications for VET trainers in 2009, not much progress has been made. VET providers at chambers and other institutions offering a diversity of newly developed training schemes below and above the standard trainer aptitude test constantly report a lack of demand. While educationalists repeatedly stress the lack of pedagogical competences of workplace trainers, the industrial economy is obviously reluctant to invest in these.

To find reasons for the striking discrepancy between policy and practice, the Federal Institute for Vocational Education and Training in Germany (BIBB) launched a research project in 2009. It followed a qualitative methodology based on extensive case studies and focused on "The situation of apprenticeship trainers in companies" (Bahl & Blötz, 2012). The purpose was to learn about the daily work situation of different types of trainers in a comprehensive manner, and the data we gathered turned out to be very rich and fruitful for tackling a variety of research questions in the field of training in the workplace.

Aside from analysing the trainer position and the training task from the structural point of view of the VET system, the main purpose of the case studies was to picture the actual practice of trainers from within the world of work. By listening to the personal beliefs and explanations of trainers, their superiors and the apprentices, we gradually disclosed the dynamics of training as lived and experienced by the immediate partners involved in the training mandate.

This chapter suggests that one of the deficits of VET policy lies in its restricted conception of trainers as individual agents and educators. The organisational conditions of training in an economic setting have an essential impact on the daily practice of in-company trainers but are usually neglected by both educational research and policy. Referring to our own as well as other empirical studies focusing on workplace training, the following sections will shed light on the inner dynamics of the company's training mandate and suggest viewing it less as an educational than as a social practice. First, I will introduce the notion of the trainer in German apprenticeship and the methodology chosen by our project to approach it empirically. Three of the company cases are used to illustrate typical organisational settings of trainers. Second, I will present the position of these trainers from a systemic point of view in respect of both the VET system and industrial practice. Inspired by the personal narratives of the trainers, a model of three partners in social exchange will be applied to acknowledge the intermediary position of the in-company trainer. The next section will explore the mutual relationships in detail. Then, threats to this general dynamic of the training mandate will be explored. Finally, conclusions for VET policy are drawn.

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1   Even the implementation of this minimum educational standard (120 h of preparatory training) for apprenticeship trainers encountered many obstacles during the past decades and strong resistance on the part of the industrial economy, leading as far as a temporary suspension of the regulation from the year 2003 to 2009 (Bahl & Brünner, 2013).

2. In search of the 'trainer' as a person – three typical company structures

One of the first empirical challenges was how to match the legal definition of the apprenticeship trainer with actual employees and their practice in German companies. According to the regulations of the Vocational Training Act (BBiG) enacted in 1969, any company wanting to offer apprenticeship training has to fulfil prerequisites with regard to the suitability both of its training premises and its training employers and trainers (BBiG 2005, § 14). The regional chamber is responsible for the monitoring, and every training company needs to register at least one employee at the chamber who can function as the designated responsible trainer (*Ausbilder*) and fulfils the necessary requirements. Proof of qualification besides a vocational qualification is the successful completion of an examination as defined in the Trainer Aptitude Regulation (AEVO, § 2). Trainers in skilled craft businesses are usually master craftsmen, since the trainer aptitude test is a regular part of the examination for a master craftsman's diploma. Outside the craft trades, any AEVO qualified trainer is acceptable. In 2015, a total of 647,322 persons (BIBB, 2017) were officially registered as trainers. These designated and legally responsible trainers, however, usually do not fulfil their task alone. Therefore, the actual number of persons practically involved in apprenticeship training in German companies is much higher. Previous national employee surveys by BIBB suggest that across all sectors at least six million employees regularly fulfil training responsibilities in apprenticeship, albeit to varying degrees (Bahl, 2012).

To approximate the diversity of training situations, the project conducted research at 14 companies all over Germany and picked cases that differed widely with regard to size, sector, region and training occupations offered. Following the theoretical sampling approach of grounded theory, we chose the case studies successively and carried them out between 2009 and 2012. The team conducted a total of 127 semi-structured interviews with employees belonging to the following groups:

- ▶ Company owners/human resource (HR) managers/heads of training departments
- ▶ Full-time and part-time trainers
- ▶ Line managers/superiors
- ▶ Employee representatives
- ▶ Apprentices/trainees

We found a wide range of trainer types and profiles. The bigger the size of the company, the more complex was the distribution of tasks among them. Furthermore, the singularity of the occupation and the sector affiliation of the company and its respective workplaces have an impact on the training structure. The following three companies each represent typical examples of a majority of German training companies belonging to the private sector.

Training in the manufacturing industry

The first is a traditional example of the manufacturing industry. It is a power and electrical engineering plant with locations in different regions of Germany. At the top level of planning, training management and administration, one training manager is formally responsible for the whole company. This person belongs to the HR department of the head office and main location. In this particular case, she is also personally responsible for the small number of apprentices in commercial occupations at the main location as well as all trainees following dual study courses.[2] Fast innovation cycles of technology render training contents, particularly in the field of industrial production, increasingly complex and challenging to transmit. Thus, before being able to integrate apprentices of the technical occupations into the plant's immediate work process, basic skills have to be imparted independently of production, in separate training courses. For this purpose, large companies have installed special training workshops.[3] In this case, these facilities are provided equally at two regionally separate locations, and two master craftsmen have been exempted from production and asked to work as full-time trainers in the respective workshops. The apprentices receive systematic training in mechanical and other occupational skills before they start rotating between the different production units, successively receive tasks and become part of its respective work processes. During the second, third – and in some occupations fourth – year of training, they gradually spend more time in the actual business units. While the staff of the workshop is responsible for coordinating these work placements and for networking between the divisions, the line managers and workers of the business units take care of the direct guidance in the workplace to differing degrees. They only temporarily act as trainers, and do so as a sideline to their regular job. Therefore, these employees can be classified as "part-time trainers". Often they rely on further colleagues in their team, and the boundaries between formally designated and informal workplace trainers can be blurred. Figure 1 gives a schematic representation of the typical distribution of trainer types from the level of management and planning to the level of implementation at the different sites of the company structure in the manufacturing industry.

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2   The latter circulate between the locations but sign their contracts at the main location.

3   Large companies that can afford to run and equip separate training workshops comprise only 4.8 per cent of all companies involved in apprenticeship (Schönfeld, Wenzelmann, Dionisius, Pfeifer, and Walden, 2010, p. 41), but due to their size and reputation and high numbers of apprentices in a diversity of occupations, globally they tend to be the companies most readily associated with the German dual system. For those firms that are too small to operate their own facilities, training workshops above single firm level have been established by the Chambers and by professional associations.

Figure 1: Schematic distribution of trainers of a large company in the manufacturing industry (8600 employees)
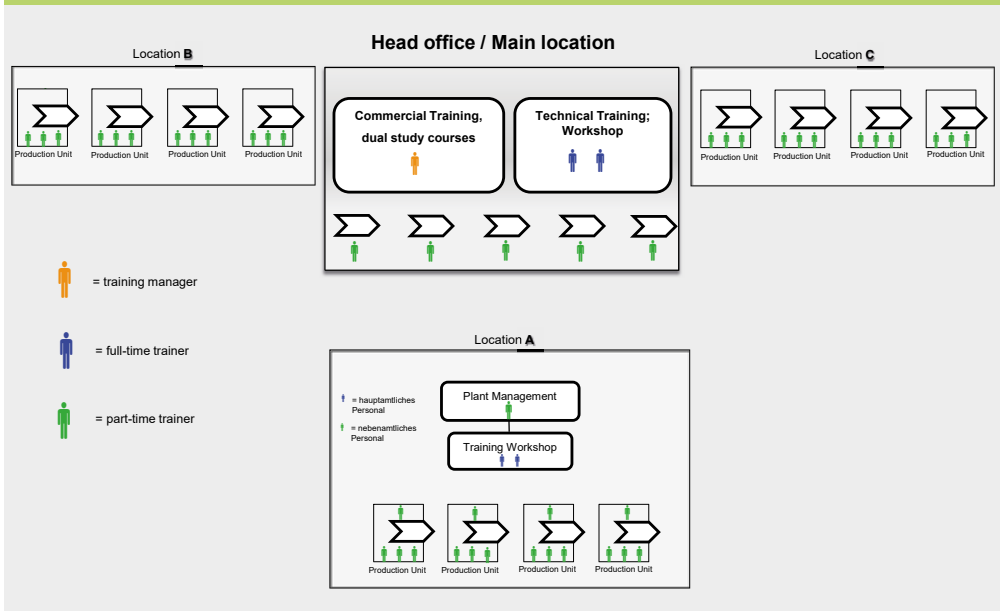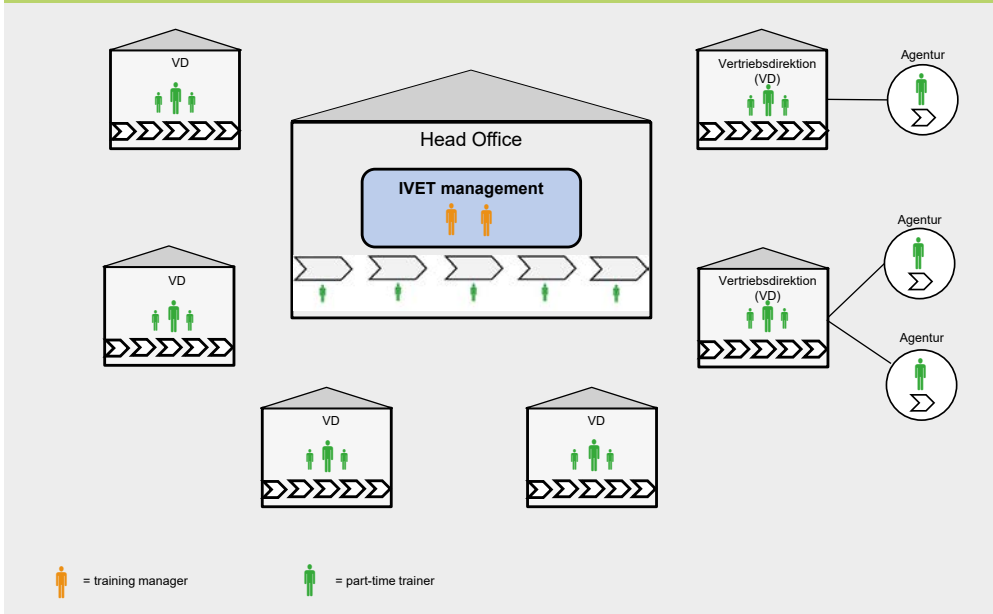
Training in the services sector

The second case is a typical example of a large company in the services sector with regional branches. Here it is an insurance group but the organisational structure – except for the local agency representatives – is quite similar for banks, hotel and restaurant chains and other businesses belonging to a group and relying on staff in the commercial occupations or hotel and restaurant trades. In this particular case, two women in the HR department of the head office share the position of training manager for the whole group.

Both at the headquarters' business units and the regional sales head offices, various clerks have been designated as responsible trainers for their immediate work environment. All of them fulfil this position in addition to their regular job description. From the very beginning, the apprentices are integrated into the regular work processes, and there are no full-time trainers in this example. Figure 2 illustrates the typical distribution of trainer profiles in medium and large enterprises of the services sector with branches.

Figure 2: Schematic distribution of trainers of an insurance group with (altogether) 37 branches across Germany (5500 employees)

Training in the crafts sector

The third case represents a typical small to medium-sized enterprise (SME) in the crafts sector. It is a family-owned business with a total of 25 employees (including six apprentices) providing services in the electrician and sanitary trade. Typical workplaces are private households of clients and construction sites where old houses are being renovated or new ones constructed, and the apprentices start working on these sites from the very first week. The owner holds a master craftsman's certificate and is the formally designated trainer registered at the chamber. He is responsible for the apprentices but delegates their daily instruction to his journeymen, who actually work with them in shifting team combinations. Due to their small size and increasing specialisation, most SMEs of the crafts sector are not able to impart all contents required by the training regulations autonomously. Therefore, apprentices usually attend additional courses at inter-company training centres, taught by master craftsmen who are employed as full-time trainers. In this occupational case, apprentices spend ten week-long courses at this centre, stretched over three years of training. Figure 3 schematically illustrates the diversity of workplaces and respective training situations in this particular craft sector.

Figure 3: Schematic distribution of trainers of a SME of the crafts sector (25 employees)
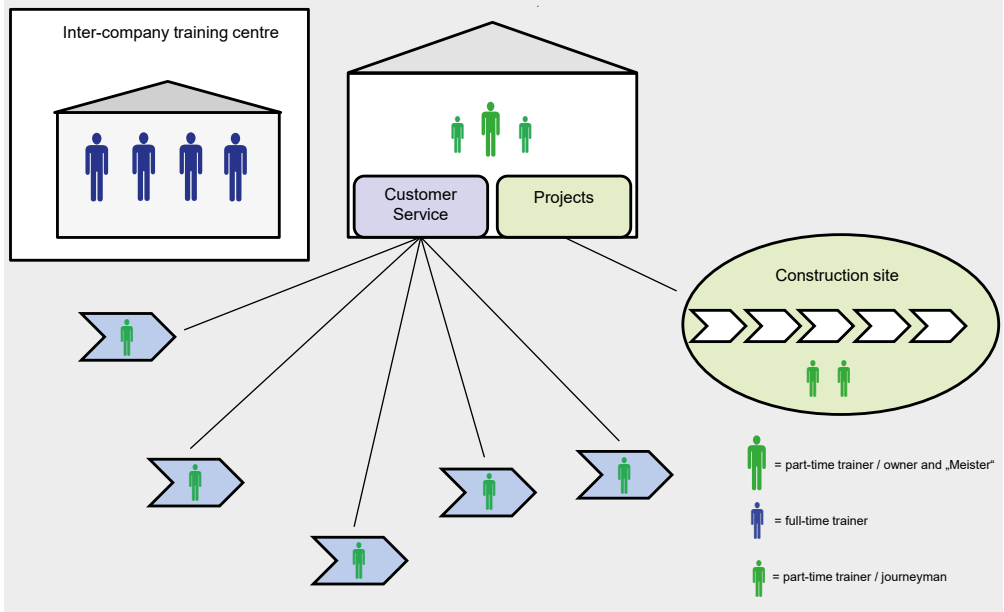
The majority of German training companies in the private sector can be roughly clustered according to these three general organisation patterns, although the variety of the actual workplaces is much higher and reflects the diversity of the German industry as a whole. Thus, when looking at in-company trainers from an empirical point of view, we are dealing with a huge, very heterogeneous and diffuse target group. Previous national surveys suggest that 94 per cent of all employees somewhat involved in apprenticeship training are "part-time trainers", but far from all of them actually identify as such. Some are not even aware of their training function since apprenticeship is an essential part of their company culture and rarely explicitly reflected upon. Others do not consider themselves as trainers but as occupational experts with an additional educational function (Schmidt-Hackenberg, Neubert, Neumann, and Steinborn, 1999; Bahl, 2012).

Hence, an important result of our research was that the notion of the 'trainer' as an individual person is simplistic and overly narrow in the case of apprenticeship, since the training function is normally shared by several employees. Depending on the size of the company, it is either the whole or a large part of the workforce that is involved in training the novices. In practice, therefore, it is rather the "community of practice" (Lave & Wenger, 1991) that "trains". The officially designated trainer relies on many other workplace trainers acting in a less formal to an entirely informal capacity. These are skilled workers and clerks who take on training tasks in the enterprise's departments, on assembly lines, in commercial and engi-

neering offices or in the services sector. As trainees pass through the enterprise, these trainers provide them with hands-on experience in actual work processes. At the same time, these are employees who have not necessarily obtained the trainer aptitude certificate. All in all, apprentices probably spend the majority of their training time in the company with this type of trainer, although this group is usually the least formally trained pedagogically.

3. Systemic challenges and the intermediary position of the in-company trainer

What does the company's training mandate legally imply for the chosen trainers? On the one hand, they have to fulfil a public task regulated by the VET system. They have to prepare young people to attain an educational qualification and successfully pass the chamber examination for their chosen occupation. Here they have to respect standard regulations set up by the state, i.e. the Vocational Training Act (BBiG § 14). On the other hand, they have to develop well-qualified and loyal new workers that meet the specific needs of the company. In order to achieve both aims, they depend on high motivation in their individual apprentices. Responding to their personal needs and balancing economic and educational goals is a prerequisite for this.

As a result of their particular task, German apprenticeship trainers are formally positioned between the education and employment system and need to balance conflicting role expectations with regard to their charges. Quite the opposite of teachers at VET schools, their regular job description is not an educational but an occupational one, related to their function in the business process of the company. To secure their jobs, they depend on the economic success of their company and not on their pedagogical qualification. Furthermore, the trainer's responsibility for overseeing new entrants to the workforce on behalf of the management puts him or her in an awkward position, since s/he remains a dependent employee on the one hand and becomes a superior to the apprentice on the other. While it is the management's responsibility to recruit and contract these newcomers, the duty of easing their subsequent adjustment to the new work environment lies with the trainers. Due to their specific task and intermediary position between employer and employee status, trainers often lack institutional support from the works council.[4] Because of their ambivalent and precarious status (Schlösser, Drewes, and Osthues, 1989) as pedagogical staff in the company context, educational research has characterised the position of apprenticeship trainers in economic organisations as "institutionally weak" (Pätzold, Drees, and Lietz, 1986). This phenomenon appears as soon as the training responsibility is delegated to specific colleagues or business units rather than continuing to be shared collectively. Therefore, it primarily applies to medium and large companies, regardless of sector.

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4   Both the Vocational Training Act (BBiG § 27–30) and the Works Constitution Act (BetrVG § 98) protect apprentices from training employers and trainers who do not display the proper personal aptitude. Therefore, committee members traditionally tend to take sides with the apprentices when conflicts arise and are barely aware of the constraints of the trainers' role.

Structurally speaking, the position of the in-company trainer is a challenging one and the narrative of our respondents reflects this dilemma. When asked about his role in the company context, a recently retired and highly respected training manager of a large company in the automotive industry used an interesting metaphor:

> You are always caught between a rock and a hard place. You have obligations to management, of course. You also have obligations to the apprentices, to the workers' councils and to the parents. You need to remain very balanced and keep a clear head when approaching things. […] This involves considerable personality skills, […] like a politician, […] to ensure that everyone is happy to some extent. [10_01_HA, 426]

His depiction hints not only to the specific intermediary position of a trainer in apprenticeship but alludes to an important social dynamic affiliated to it. Apparently, his duty as responsible trainer cannot be adequately captured by a formal job description and technically executed accordingly but implies constant negotiation and diplomacy with a diversity of partners within and beyond the company context in order to be acknowledged and successful. Although he is accountable to the management only, he enumerates several other stakeholders, including the apprentices and their parents. While not mentioning all the expectations incumbent upon him explicitly, a diversity of obligations, including moral ones, come to the surface.

In spite of the diversity of sectors, companies and work contexts, all the case studies had in common that the success of training depended heavily on good work relations and mutual recognition and trust between the stakeholders of the training mandate. Moreover, a trainer or training manager cannot fulfil the task alone but relies on the voluntary support of other formal or informal workplace trainers located in further business units of the company. Collegiality among the workforce is thus an essential prerequisite of training. Since this quality depends on attitudes that cannot be prescribed by the management, the dynamics of training have a bearing on social exchanges. Inspired by similar observations made by the social anthropologist Béatrice Maurines in French industrial plants in the 1990s (Maurines, 1997), the suggestion is to grasp the mutual dynamic between the management, the trainers and the apprentices as a triangle of social exchange.[5] This model helps in systemising the findings with regard to the position of the trainer and its interdependence with others in the company context and will be presented in more detail in the following.

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5   Maurines conducted extensive fieldwork in several chemical companies of the Rhône–Alpes region south of Lyon. While focusing on the induction of new workers, she realised that the transmission of knowledge and skills from experts to novices depended heavily on a relationship of social exchange and trust between the two. Taking up the bilateral notion of social exchange as defined in the works of Peter M. Blau and considering it in the context of a strong hierarchically oriented, economic setting, Maurines suggested extending the mutual exchange model to a third partner, i.e. the hierarchy (1997, p. 9).

Figure 4: Interdependency of the in-company trainer position
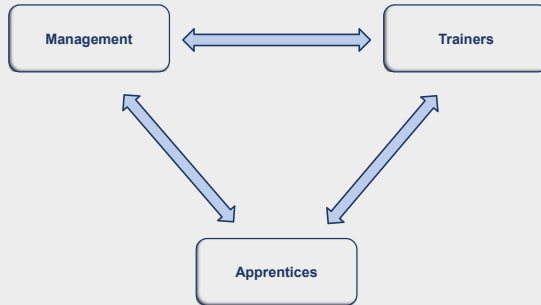
4. The general social dynamic of the training mandate

Based on our qualitative data, this section will disclose the hidden social dynamic of the training mandate and will primarily focus on the effects on the trainer position.

4.1 Selection criteria for trainers on behalf of the management

To sustain their workforce and competitive capacity, medium and large companies in particular depend on employees who function as trainers, are qualified to do so and ideally do not expect any financial or other compensation for this additional task. From an industrial and economic point of view, some selection criteria for these employees in question prove to be most relevant and, therefore, were repeatedly mentioned by the representatives of the management. Surprisingly, possessing the trainer aptitude certificate (AEVO) turned out to be less relevant than officially stated (Bahl & Brünner, 2013, p. 523f.). To comply with the rules set by the VET system, the management usually formally acknowledged this requirement; in practice, however, practitioners shared a different notion of "aptitude" with regard to social traits. When striving to develop qualified new workers, it is reasonable to look for employees that are both highly knowledgeable in the relevant occupation and loyal to the company, since they will serve as a role model to the novice. Practice shows, however, that not all formally qualified employees – both occupationally and pedagogically – are equally willing to share their knowledge with others (cf. Billett, 2002, p. 463). Some feel threatened by newcomers since they fear to become redundant by investing in an (often younger) colleague. Others generally prefer to work by themselves and are little inclined to training and explaining what they do to others. A statement of a full-time trainer of a company of the metal industry brings this to the point:

> Most divisions see apprenticeship as being very important. They are pleased to get well trained people, but most divisions do not actually wish to have anything to do with training itself. [08_06_HA, 250]

Therefore it is essential for the management to recruit individuals that are already inclined to the role, show a dedication to young people and finally, in the best case scenario, do not expect any financial remuneration but volunteer for the additional task.

The majority of the trainers we interviewed had not initially applied for this position but were approached by their superiors and asked whether they could imagine taking over this role. Often the phrase used is, "It just turned out that way", meaning that moving into the trainer position was a kind of 'natural progression'. Previous studies give hints in a similar direction (cf. Schmidt-Hackenberg et al., 1999, p. 26; Bahl, 2012, p. 27f.), suggesting this recruiting practice to be typical for German apprenticeship training. The following case illustrates in an exemplary way the usual and thus "natural" practice supporting this process. A long-standing training manager of a chemical park in Eastern Germany answers how she identifies suitable employees in the production units and how the hierarchy recruits them:[6]

> You already know the colleagues from the plants in some cases, the older ones anyway; and you also get the feedback from the apprentices. And when you hear from the apprentices things like 'Oh yes, this man, he supervised me, it was great, he showed me so much.' So, yes, that makes me think, 'Interesting, you haven't even got to know him yet as a trainer'. Then I make contact, for a start, if it's a new colleague, I make contact and we have a one-to-one talk at some point. Then I go to the plant manager and say, 'He's a good supervisor, wouldn't it be an idea to have him as, have him do more supervising, how about it?' [07_07a_HA, 400-402]

Apparently, this training manager uses her informal talks with apprentices to get a picture of the daily work practice in the respective divisions. When they report having had positive experiences with workers who helped them and guided them in some way or another, she asks for their names. If she does not know them personally yet, she invites them to her office for coffee to learn more about their attitude towards work, training and young people. If her impression is positive, she gets in touch with the line manager of his team and asks for his opinion. If they come to an agreement, this worker will also be formally asked to function as a trainer.

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6   The management of medium and large enterprises usually shares the recruitment task with the appointed training manager and further officially designated trainers. Thus, the boundaries between management and trainers in this regard become blurred.

4.2 Training as a gain in autonomy, trust and self-esteem

What does the trainer gain in return from this new role? Ideally, a benefit of being a trainer is the recognition by the management as a competent and trusted employee. The majority of the trainers we interviewed conducted training as a sideline. If they were not suffering from excessive time constraints themselves, many enjoyed the additional task because it offered a change from their usual job routine. Moreover, the trainer role provided them with quite some autonomy in defining and fulfilling this new task. This was a surprising finding, since the German VET system provides detailed training regulations for all occupations. Every regulation contains the general syllabus and timetable for the training and most companies adapt them to their particular business process.[7] The case studies revealed, however, that most workplace trainers did not bother about them but rather relied on their own conviction and occupational pride to know what needed to be imparted in their division. The following statement of a life insurance clerk at the head office of the large insurance group introduced previously (cf. figure 2) illustrates this stance:

> No, I am broadly given a free hand by my head of department, who trusts me and believes that things are being run properly on the basis of the positive feedback provided by the trainees. Examination results are good, and this means that there is no reason why I should be given wider stipulations or different stipulations. […] And I also find it good that he gives me a relatively free hand and that he does not influence my work in terms of the way in which I do it. [02_06_NA, 135, 201]

This trainer appreciates the autonomy attributed with the trainer position. And the training manager of the whole insurance group, confronted with our question about stipulations or guidelines for the trainers' practice, explains:

> In fact the whole of the selection procedure [of apprentices] is pre-stipulated. Such matters are laid down. The things in between, however, training in daily life, in the department, in the [sales office], within the division, involve creative individual decision-making. To this extent, we cannot influence the process. And we do not seek to do so. We have no desire to meddle. We prefer to approach the topics in a convincing way. [02_15_HA_FK, 521]

These example responses disclose how much the management, in this case the training manager, depends on the individual and ongoing motivation of the appointed trainers. It is chal-

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7   Currently (2018) Germany has 327 occupations that require completion of formal vocational training and are state-recognised nationwide. The training regulation stipulates in binding terms what has to be learned for the particular occupation. The general training plan provides the foundation for the in-company initial vocational training plan which training employers are required to draw up for their trainees and which they submit to the relevant body together with the individual trainee's training contract.

lenging enough to recruit employees who volunteer for this additional task; therefore the stipulations for them are kept to a minimum. She supervises the training formally and allows for flexibility in the interpretation of the training curriculum as long as the apprentices successfully pass their final chamber examination.

4.3 The interdependence of trainer and apprentice

What about the dynamic between trainer and apprentice? As a representative of the occupation, the trainer becomes an important authority to the apprentice. His or her knowledge and skills are essential for the qualification the novices want to acquire; the latter depend on his or her support and advice while slowly becoming acquainted with the new world of work. How much support they receive depends on the circumstances of the individual workplace, the personality of the trainer and the respective learning culture of the firm and sector (Bahl 2018). As manifested by our data, the apprentice's individual attitude, though, has an impact, too. The more he or she manifests interest and curiosity in learning and engages him or herself in getting the work done, the more the trainer will usually be willing to share his or her knowledge and provide access to further learning opportunities and interesting tasks.

The benefits of being a trainer are diverse and strongly depend on the trainer's individual personality, the work situation and the respective pressures felt. Some enjoy being with young people and underline that every apprentice is different and poses a new challenge. Most enjoy watching the growth of a young person during apprenticeship and are happy to be able to contribute to this. Some are more prosaic and rather conceive of training as a necessary matter of 'return on investment'. After investing their time and energy in imparting the most basic skills to the novice, they finally want to harvest the fruit and take advantage of their manpower.

Many respondents reported that dealing with the young and meeting their needs kept them young and lively themselves. Others, however, suffered from conflicts with apprentices whose undisciplined behaviour presented an enigma and a burden to them (Bahl & Blötz, 2012, p. 35f.). Positively speaking, the questions raised by the presence of the apprentice force the trainer to interrogate himself and continuously update his knowledge, both occupationally and pedagogically. By responding to the novices, trainers continuously rebuild their own expert status and reaffirm themselves as competent employees (cf. Maurines, 1997, p. 11).

The way in which an apprentice and trainer relate is of key importance for the transition into the world of work and the overall success of apprenticeship. A disturbed relationship can potentially threaten the fulfilment of the training contract as a whole.[8] In addition, our research reaffirms previous findings of the 1980s and 1990s (Kutt & Wonneberger, 1986; Sommer & Nickolaus, 1995) about trainers' general tendency to attribute training failures to

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8   Specific studies on this matter in Swiss apprenticeship (Masdonati & Lamamra, 2009; Nägele & Neuenschwander, 2016) confirm the crucial importance of this relationship.

causes beyond their influence and person. Personally, they often see no need for professional development as educators and few companies encourage and smooth the way for such a career. The chances are that the greater the lack of pedagogical skills and capacity to evaluate one's one behaviour, the higher the risk of blaming the apprentice.

Distributing the training responsibility among several employees, as it is standard in medium and large companies, can thus be an advantage if both partners do not get along well. In general, however, trainers endeavour to avoid the escalation of any conflict. Particularly in sectors with a long-standing apprenticeship tradition, trainers highly identify with their moral responsibility for the young and try to protect their apprentices as well as possible when these get into trouble in the company or at home. The following written statement on behalf of the BIBB project from a training manager of a major metalworking company reflects this protective stance:

> The trainers are mostly the main (and only) point of contact for the trainees. They also accept the direct responsibility that results from this. If the trainers are unable to assist further, there are usually direct negative consequences for the trainees, which are also directly felt by the trainers. This leads to the compulsion of "having to act", even if company structures do not allow for this and trainers frequently find themselves acting outside their actual field of activity and responsibility and thus compensating for weaknesses in the company structures.

Aside from the dependency of the apprentices, the quote refers to the mutual dependency of the trainers. The generally weak status of the apprentices in the workforce – and in particular the minors among them – morally puts their supervisors under pressure to help them by all available means to successfully accomplish their training, even if the company does not provide adequate support. At the same time, the management and general workforce tends to rate the performance of the trainer according to the success of the apprentice. Contrary to any pedagogical consideration, the assessment of the trainer's aptitude and skill in his / her task is generally deduced from the progress of the apprentice. This, in turn, can be a dreadful correlation, if the apprentice is weak and performs badly.

5. The vulnerability of the in-company trainer position

As the analysis of the relation between the three main stakeholders of the training mandate in this model has disclosed, the balance between them is a fragile matter. Many circumstances at the workplace can threaten the potentially beneficial exchange of social acknowledgement and recognition. The case studies revealed the huge impact of the organisational context on the trainer's position and role. An institutional handicap of the formally designated trainers is that they are dependent employees, whilst at the same time acting as employers in relation to the apprentices. Their personal success as trainers depends on the support of the management in their task, on the one hand, and motivated young people, on the other.

Besides the general work organisation of the company and branch, their scope of action also largely depends on their individual position in the organisational hierarchy. If they happen to be middle managers themselves or personally get along particularly well with their line manager, they have a better chance to adapt and improve their training activities according to their own as well as their apprentice's needs than someone whose job description is more limited.

The motivation to engage in training depends on a reciprocal and triangular relationship between trainers, apprentices and the management. A work culture based on reciprocity and trust is a prerequisite for the recognition of the trainer's contribution. Global processes of re-organisation such as outsourcing and segmentation, though, affect this culture, and growing cost pressures and acceleration of work processes bring an exacerbation in personal time- and goal-conflicts for trainers.[9] Against this profit-driven background spending working hours on instructing apprentices continuously tends to lose its status as a given. Regardless of the sector, the trainers from our sample repeatedly reported legitimation issues within the employer context. Increased profitability requirements pressure them to prove their legitimacy as trainers in *economic* terms. The dwindling support of the management hence leads to the foisting of the full responsibility for training onto individual employees. Most respondents, however, were poorly prepared to do anything against this trend, became defensive or had even personally internalised their training function as "loss-making", as this statement of a full-time trainer illustrates: "Because we do not earn any money in this sense, we're not productive, (laughs quietly) are we?" In the case study of a market-listed holding of the information and communication technology sector, we met trainers who suffered from cuts in their calculation of premiums, since they invested working hours in training apprentices instead of billing on behalf of clients. One was so frustrated after endless discussions with continuously changing line managers who asked him to legitimise his 'personal' interest in training and draw up plans all by himself, that he finally quit his role. These examples illustrate how short-term objectives and economic profit interests can unwittingly lead to a displacement of the trainer position or complete abdication of it. A positive exception, however, was the training manager introduced earlier, who characterised himself as being "between a rock and a hard place". Faced with management's threat of outsourcing the training function altogether, he chose an offensive strategy for himself and his staff. By highlighting that "we are producing something here, namely skilled workers", they adjusted the training to the discourse of the management's new business philosophy and finally succeeded in establishing apprenticeship training as a "core process" in their company.

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9   For similar observations for Swiss apprenticeship cf. Besozzi, Perrenoud, and Lamamra (2017).

6. Conclusions

This chapter analysed the trainer position from a practice perspective situated right in the workplace and considered its wider organisational and economic frame within and beyond the company context. By applying a qualitative approach in the tradition of *grounded theory* (Strauss, 1998) plausible reasons are found for why few trainers respond to the public calls for professional development. Most trainers do either not see the value of obtaining an explicitly pedagogical certificate or lack the support of management to invest in this type of competence.

For VET policy, many important lessons can be learned. First, the general call for professionalisation of VET personnel in German and European policy does not adequately respond to the particular situation of workplace trainers. Policy summarises them under the joint label of an occupational group, but as we have seen, the persistent analogy with VET teachers at schools is misleading. In apprenticeship at least, we have to speak of an additional *function* and need to target a much more heterogeneous group of employees. Second, focusing on workplace trainers as *educators* obstructs trainers' challenges within the restricted conditions of training in an economic setting. Third, the actual practice of providing initial training in the workplace is better understood by looking at it as a social rather than an educational practice, based on reciprocity and social exchange. The quality of training is linked to a fragile balance of 'give and take' between the management, the employees appointed as trainers and the apprentices.

Therefore, learning in the workplace needs to be promoted as a concept that entails more than insular situations of instruction but requires a supportive and comprehensive strategy for the organisation as a whole. VET policy needs to better address the benefits of investing in the training of trainers on the part of companies. The "hidden protagonists of workplace learning" (Ostendorf, 2012) merit being brought into the limelight. Finally, professional development of workplace trainers requires, as a starting point, the systematic reflection of their role within the respective company context. Strengthened awareness and self-esteem in their role as learning facilitators (cf. Harris in this volume) are prerequisites for the development of personal strategies to negotiate the contradictory demands they face.

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▶ Embedded Research and Learning at, for, and through Work in Singapore

1. Introduction

From the pragmatic outcomes of research projects on workplace learning, curriculum and identity formation, I present and comment on the unique relationship between research, workplace practice and policy-making engendered through location in Singapore's Centre for Work and Learning (CWL) 'embedded' within the Institute for Adult Learning (IAL), an education and research organisation within the Ministry of Education (MOE). CWL research projects are premised on wide consultation and partnerships with relevant government and industry stakeholders. The understandings, experiences and relationships developed over time through these and other projects within this interesting context have led to the emergence of novel research approaches and practice-based theorising that may be of value in other national and international vocational education research locations.

Two recent studies are discussed that demonstrate workplace-learning outcomes achieved through an embedded institution-workplace research strategy. They illustrate how a research centre is able to leverage or achieve rapid public implementation of project findings in a range of ways. First, I outline the workplace curriculum outcomes of a project examining the meaning and understanding of 'quality curriculum' in institutional settings and how such understandings have contributed to enhancing the development of meaningful and sustainable workplace curriculum practices. Second, I examine a study that investigated Adult Educators (AEs) (a term used to describe Singapore's vocational educators) and how they navigate the world of freelance or casualised labour within private sector training agencies through the development of malleable or 'shapeshifting' workplace identities. From both projects I discuss the development of practice-based 'deliverables' and the ways in which they have been implemented across the nation's Continuing Education and Training (CET) sector.

The chapter is arranged into five sections. First, I briefly outline the broader Singapore socio-cultural and administrative contexts, including developments within the CET sector, as a background to understanding the environment in which the research studies were conduct-

ed. Second, I describe the institutional-workplace process developed and used to promote ethically sound research while eliciting sustainable changes in workplace practice. Third and fourth, I detail and discuss the research projects outlined above and their major practice-based outcomes. Fifth, I conclude with a review of our 'embedded' research approach and its potential value beyond Singapore.

2. The Singapore context

Singapore is considered a leading 'Asian Tiger' in the emerging 'Asian Century'. The country's rapid economic and social development was no accident but a rags-to-riches story driven from the mid-1960s though the charismatic and sometimes authoritarian leadership of founding Prime Minister Lee Kuan Yew and his People's Action Party, which has held sole office since independence in 1965 (Lee, 2009). With a total population of around five million, including about a million foreign workers, on an island no larger than a medium-sized Western city and without any natural resources, apart from its people, Singapore's global positioning as one of the world's wealthiest and per capita best educated states is a remarkably successful 'from third world to first' narrative (Lee, 2009a). Celebrated and some claim reinvented as 'The Singapore Story' – part reality and part myth – the national story is told as a pragmatic, meritocratic and technocratic representation of Singapore's 'can do' reputation, which has been deeply embedded in the national psyche as a survivalist narrative, with the wolf always potentially at the door.

Singapore was quick to capture the late-twentieth-century winds of globalisation and free market neoliberalism and combine it with a collective, even socialist, approach to governmentality (Choi, 2011). With this seemingly contradictory – but pragmatic – approach it has been able to generate huge national and, for some, individual wealth while providing extensive redistributive mechanisms for the less advantaged, not through paid welfare but rather as a raft of incentives, schemes and education and training initiatives (Lee, 2009, 2009a). It is perhaps no accident, then, that in order to manage these myriad programmes and policies the government Civil Service remains the country's largest employer (Kong, 2011). The tension between economic radicalism and conservative government authoritarianism has recently been referred to as 'The Singapore paradox' (Amaldas, 2009), and often sits uneasily with its people (Tan, 2011).

It is within this political, economic and socio-cultural ecosystem that Singapore created its CET sector, the country's major engine for upskilling its non-university educated workforce, and an ongoing national priority. Until recently the sector was siloed from the pre-employment (PET, or schools) and post-compulsory university sectors, creating considerable challenges for intersectoral movement and subsequent education and training flexibility (Willmott, 2011). From 2016 this was addressed through re-imagining the Workforce Development Agency (WDA), the organisation created in 2003 to steer the CET sector from within the Ministry of Manpower (MOM). The WDA was partitioned, with one half remaining

within the MOM as a new statutory board named 'Workforce Singapore' (WSG) and given responsibility for employment programmes and fostering workplace efficiencies. The other half, WDA's research, education and training arm, a significant part of which was located within the Institute of Adult Learning and less so within the Council for Private Education, was relocated within the MOE. IAL would continue its former role within the Ministry of Education as a deliberate strategy to address the former siloing effects of the national education system. This portion of the WDA was rebranded as 'SkillsFuture Singapore' (SSG) with its own statutory board charged with the mission of promoting a national culture of lifelong learning though cooperation with the MOE, MOM and Ministry of Trade and Industry (MOTI). To enable this, the SSG was charged with developing a way for all education and training qualifications to be recognised for the purpose of enhancing citizens' academic and career advancement (Ministry of Manpower, 2016). The bureaucratic reshuffle represents a major conceptual shift in the nation's approach to workforce education.

3. Embedded research and the research–workplace interface

It is within this rapidly transforming landscape that IAL's Centre for Work and Learning (CWL) conducts its research activities ethically, sustainably and fearlessly. Ever adaptable to bureaucratic and policy shifts, the centre has constructed an iterative process of managing projects that are connected pragmatically to achieve outcomes matching the labour market aims and objectives of the ministries and organisations with which it collaborates. In a recent IAL policy document the organisation's research mission has been stated as creating 'a comprehensive, rigorous and relevant knowledge base to strengthen our ability to develop evidence-informed workforce development and lifelong learning policies as well as learning practices, thereby contributing to: economic vibrancy and growth through workforce development and skills; better employment and CET decisions by all stakeholders; [and] effective and impactful learning outcomes for adult learners as well as enhanced employability of our workforce' (IAL, 2016).

As a research group located, or 'embedded', within government, the CWL self-monitors research probity and integrity through a transparent process shared at all times with major project stakeholders, which may include at various times active dialogue with stakeholder representatives from government ministries and organisations, policy makers, fellow researchers, professional associations, workers and managers, and the private sector. The challenge of being embedded with a large government department, then, is to maintain an ethical distance from stakeholder agendas that may seek to influence research outcomes that criticise or contradict stated departmental or industry policies, procedures and practices. This rarely occurs, however, as the project management process identifies any potential issues and resolves them through the ongoing consultation process.

Projects draw their theoretical assumptions from prior research experience and a socio-cultural perspective that recognises workplaces are 'continuously created and recreated

through the complex interplay of historical, cultural, material, structural and normative factors' (Evans, 2015). Evans continues that it is within this context that workplace participants receive, accommodate, transform, practice and recreate knowledge and skills, a process we label 'workplace learning' or learning at, for and through work. 'Work-based learning', however (and perhaps arbitrarily), we characterise as provider-based education and training operating within corporate imperatives that often ignore these complex power relations and cultural sub-texts. The realities of project management, however, recognise that research outcomes often combine assumptions built across the workplace and work-based spectrum.

For the centre (CWL) the 'messiness' of workplace learning can begin to be understood through three theoretical lenses: first, through a focus on the development of expertise and individual competence that moves beyond simple behavioural conceptions to those emphasising workers' generative capabilities, including problem-solving, innovation, group productivity and cooperation, contingency management, and critical thinking; second, through a focus on power relations and the questions they raise about the politics of learning and their mediation by corporate and state discourses, particularly in relation the affordances and barriers facilitating or blocking authentic workplace learning; third, through a focus on observing, capturing and analysing everyday 'situated' workplace micro-interaction with a view to illuminating the ways in which practice is both reproduced and transformed (Evans, 2015). These propositions suggest that the research methodologies employed to operationalise projects draw heavily from the qualitative research spectrum of case-study observations, conversational and semi-structured interviews and auto-ethnography, to name but a few.

Typically, a new project may begin as a CWL follow up from a previous project or idea generated by a research colleague, or a request from contact with relevant ministries or organisations. Emerging ideas and appropriate methodologies are then workshopped by CWL staff and presented to potential stakeholders who are brought in early as project advisors, either as individuals or as a project advisory group. This process is designed as a trust building and stakeholder 'ownership' strategy. A formal research proposal is then developed and sent for IAL approval and the advisory network formalised as a reference group. As the project work unfolds a range of interim reports are written and presented for iterative consideration by stakeholder groups. Reports generally are case study write-ups or interim data set analyses. Once the research has been completed a final meeting or workshop of stakeholders comments on the project and suggests final recommendations and subsequent actions. At all stages there is a high level of transparency and receptiveness to feedback from participants.

Over time the CWL has developed a range of 'products' that disseminate research project findings and outcomes. Given the centre's privileged embedded space within government it is potentially able to generate timely and powerful impacts on CET policy and practice. This is not always easy, however, and can take periods of robust negotiation with relevant individuals, ministries and other organisations before results are implemented, or not. Singapore is ever cautious about radical shifts in practice, but once embraced widespread change can be rapid.

Research project outputs typically take one or more of three forms, related to educational practice, research summaries and policy advice. Given the centre's research priority of enhancing workforce lifelong learning strategies many project products take shape as suggested learning guides or practitioner notes and curriculum development heuristics to better enable CET educators to develop and practice improved modes of course development and delivery. Programme research notes in various degrees of complexity, from dot point summaries to case studies and entire project reports are made available online to the public or sent directly to relevant stakeholders for consideration. Policy notes are also written that suggest how the research findings may impact on current policy and practice. Policy change recommendations may also be suggested. All output forms have over time influenced evidence-based transformation of the CET sector. The following two research project case studies demonstrate how the process outlined plays out in practice. The examples focus on the relation between adult educators and their work and workplaces, though other studies have examined a wide spectrum of the Singapore workforce.[1]

4. Case study one: The IAL Design Approach (IDeA) Model of workplace curriculum development

The IDeA Model project began as a CWL invitational round table discussion among a small group of international adult and vocational education experts on the theme of what was meant by 'quality' curriculum. The question arose from a prior in-house IAL discussion about whether or not Singapore adult educators were being adequately prepared for workplace education roles in the private and public sectors through participation in IAL's 'flagship' AE training programmes, the Advance Certificate in Adult and Continuing Education (ACTA) and the Diploma of Adult and Continuing Education (DACE). Given that most course participants had little or no prior exposure to vocational education curriculum design and implementation and that the CET sector focused almost exclusively on a narrow behavioural interpretation of workplace Competency Based Training (CBT), the research team mooted the possibility that learners may enter the workforce ill-prepared for educational leadership roles. This was a potentially problematic possibility as from 2015 all training organisations were required to employ at least one DACE trained 'curriculum expert' to lead the development and implementation of workplace education and training programmes (Bound, Rushbrook & Sivalingam, 2013). The research team raised this possibility with relevant stakeholders and a consequent project was negotiated, developed and undertaken, beginning with the expert round table and followed by data gathering from adult educators, training organisation managers, client organisations and policy makers. The issue of 'What is quality curriculum' as a project theme aimed to explore and identify the range of perceptions from both the in-

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1   For hands-on examples of research across the employment spectrum see the IAL research web page: https://www.ial.edu.sg/access-research/research-publications.html (accessed 17 August 2017).

ternational experts and the Singapore nationals with project outcomes to include a series of recommendations for the enhancement, if required, of the ACTA and DACE programmes. A careful investigation and analysis was made of each group's ideas about defining, designing and enacting curriculum. The following summarises the outcomes of this analysis.

A core consideration within conceptualisations of curriculum purpose relates to how they play out in practice. If curriculum is conceived of as a fixed instructional missive for enactment by well-briefed facilitators, there remains little room for practice-based interpretation and innovation. This approach might be labelled a 'compliant' curriculum, which the research suggested typified Singapore CET programme delivery (Willmott & Karmel). On the other hand, if curriculum is thought of as a map or scaffold upon which facilitators and learners dialogically render further nuanced meaning and content, it becomes both flexible and dynamic, in effect an 'interpretive' curriculum.

The international scholars were labelled 'interpretivists' because of the eclectic and 'craft-based' nature of their acquisition of curriculum-making skills. They also shared key ideas about the definition of curriculum. Foremost in their minds was its conception as a flexible, dynamic and engaging map of learning possibilities guided by a consistent learning philosophy. Within this framework they privileged the agential relationship of the learner and facilitator; the learner was to be respected for his or her choices in education as a life-long journey, and the facilitator encouraged to view the curriculum as a lens through which to exercise professional judgement and innovation. In a sense their musings represented an ideal view. Curriculum was imagined as unfettered by institutional or bureaucratic interventions and undertaken consequently from a position of power where curriculum choices and predispositions were enacted.

For the DACE stakeholders, labelled 'pragmatists' because of the practical manner in which they responded to and worked within a highly managed programme-making environment, curriculum was defined in instrumentalist, pragmatic and technocratic ways. It was purposive and directed to the skill development needs of the nation. There was a clear market orientation, including an implied one for employers and learners. Curriculum was expressed as a series of practical and measurable outcomes underwritten by the requirements of paid work. Its conception was within a regulatory framework defined and managed by others and had clear links with the idea of underlying assumptions of political purpose. This appeared through the interview data as a normalised and unproblematised process.

Within the international scholars' group, curriculum designing, writing and enacting was a simple extension of their craft-based definitions. Curriculum design should be premised on sound educational thinking and pay heed to the needs of stakeholders. Within its structure there should be a range of feedback loops legitimising multiple interpretations according to the exigencies of delivery. It should be written in a manner that permits maximum appeal to the agential professional educator who will massage and enact the subsequent courseware material. It should also be relevant to similarly agential learners who may have a role in interpreting the material to suit their personal as well as occupational goals. The ex-

perts, then, adopted an 'interpretive' discourse of curriculum understanding that permitted flexibility at all stages of its development and enactment.

On the other hand, the DACE stakeholders' curriculum design and writing strategies were more complex and heavily nuanced than their initial instrumental and market-oriented definitions initially suggested. This dissonance reflected a lack of exposure to the resources, ideas and eclectic experience of the international scholars' group, who were able to express deeper and wider definitions of curriculum more closely aligned with their practice. This revealed an overlap between the groups in relation to understanding the politics of curriculum contextualisation and practice. For the pragmatists, it appeared, curriculum design and writing was a delicate dance between adhering to real and perceived regulatory requirements and meeting the needs of facilitators, learners and other stakeholders. Creating the DACE programme was an exemplar of these pressures. To produce viable curricula within this environment required great skill and experience, which had been more than demonstrated, but needed to be accomplished within a discourse of compliance.

It is perhaps at the point of programme enactment, then, that most tensions arose in relation to the purposes or intent of curriculum design. To ensure a smooth 'transfer' or re-contextualisation (Evans, 2015) of planned content from the designer to the facilitator to the learner, and to meet external stakeholder skill requirements, there was assumed a requirement for the careful management of programme delivery; facilitators must carefully follow the prepared scripts and stay on task. This linear transfer process made for easy slippage into adoption of a one-way transmission or deficit model of knowledge and skills delivery, in spite of classroom strategies that explored prescribed topics using exemplary constructivist and social constructivist pedagogies where learners individually and collectively made their own meanings, but within a pre-determined knowledge and skills base. Within this compliant discourse, experienced and skilled facilitators were placed in the invidious position of being expected to deliver by rote a tightly packaged programme while knowing that significant innovation or variation may be the only way to achieve effective learner meaning making. While educators have always interpreted curriculum this way and most likely will continue to do so well into the future, it is the perception that this is not valued as an approved practice by CET employers that often drove them to conform rather than perish.

So then, what was concluded about the meaning of 'quality' curriculum? For the experts, 'quality' curricula were best-practice exemplars of their curriculum definitions and related design, writing and enactment principles. Foremost in their thinking was the quality of the relationship between theoretically informed programme construction and its capacity for interpretation by a full range of educators, from novices who rely on its careful guidance, to experienced facilitators who remain free to incorporate and further adapt its content within an advanced skills repertoire. Learners were implicated in the interpretive paradigm through working with the facilitator to re-read programme outcomes according to their needs and capacities. It is quality curriculum's potential for flexible and dynamic interpretation that sets it apart from less well-constructed counterparts.

For the pragmatists, 'quality' curriculum was judged primarily by its capacity for higher level compliance within a set of Workforce Development Agency system legitimised rules and standards. But quality also appeared within subsets of this imperative. For example, it could have been the consistency of alignment between CBT competency standards and the curriculum design objectives, the logic of modular or syllabus sequencing derived from the curriculum map, the variety or appropriateness of selected pedagogies, the level of fit between the developed programme and its underlying theoretical assumptions, the degree of interpretive freedom and risk taking – or not – given to the facilitator and learner, the level of economic return measured through increased productivity as a result of training, or the observed changes in learner workplace behaviour. This range of interpretations of quality, it appeared, depended on where the respondent was positioned in the curriculum design and delivery process, whether curriculum designer, syllabus writer, quality assurance officer, programme manager, industry stakeholder, or learning facilitator. However, most respondents in the stakeholder group appear united in their support of the 'quality through compliance' precept (Bound et al., 2013).

From these project conclusions the IDeA project team further developed an idea mooted in the report (Bound et al., 2013) to create a heuristic facilitating reflection on the underlying assumptions, aims and outcomes of any course contemplated for workplace implementation. The resulting IDeA Model posited consideration of a range of possible curriculum development ideas set out on an 'ideal' continuum from 'Interpretive' (from the 'craft' approach of the international experts) to 'Instrumental' (from the Singapore national 'pragmatists'). Learners located themselves on the continuum and reflected on the reasons for their choices. Positioned in this way they could then develop programmes knowing, or contesting, the value stances they had taken. The heuristic was further developed and tested for workplace practice as a project follow-up using an AE sample group. The model is now used within the DACE programme and made available to IAL's AE Network and the wider community through the IAL website (Bound, Rushbrook & Choy, 2016). The CWL's embedded location within the MOE and IAL ensured the model's legitimacy and the speed within which it was enacted. At all times the model's development was 'owned' by project stakeholders, adding to its rapid acceptance. It remains popular.

5. Case study two: Adult Educators' creation of 'shapeshifting' workplace identities

The workplace identity project (Rushbrook, Karmel and Bound, 2014; Karmel, Bound & Rushbrook, 2013) examined how Singapore's freelance or casualised adult educators gained or sought sustainable employment opportunities within CET providers that variously focused on delivering programmes within the formal national and CBT-focused system of Workforce Skills Qualifications (WSQs) or those providers that also offered non-WSQ and customised programmes. The project revealed that adult educators working within the 'formal' CET sec-

tor tended to be lower paid and possessed fewer skills than the more adaptable 'shapeshift-ers' within private providers. We concluded that the development of malleable workplace identities was crucial for enabling AE success across the CET sector.

The project findings revealed that workplace interaction, experience, and reflection were vital factors underpinning AE's capabilities. These forms of learning were sometimes initiat-ed through formally structured courses, but tended to happen informally through previous work experience, the experience of seeking, delivering, and refining work as a freelancer, interacting with clients, learners, other adult educators, and contacts from other industries, plus reflection on personal practice and experience. This suggested that learning through work is crucial for freelance AEs, yet challenges to such opportunities arise due to the nature of this occupation. The following discusses the project findings and their implications for freelance adult educators and the CET sector.

The motivations for trying to freelance as an adult educator varied from attempts at work-life balance, retirement and recovering from redundancy to pursuing adult education as a career focus and the challenge of being your own boss. This variety meant that some freelance adult educators had stronger skills than others and more drive to hunt for work and hone in on the development of professional skills while others were more content with small and 'safe' snippets of work that were easy to facilitate.

As well as motivational differences, the nature of freelance work meant that the work-place expanded over multiple sites, and colleagues were temporary, guarded, and largely invisible. This had implications for freelancers' ability to understand how different environ-ments operated, assessing the needs of clients, and how they positioned their skills and de-veloped contingency plans against likely obstacles. There were also implications for clients (including training providers). Each time a client engaged a new freelancer, the freelancer was expected to be competent in these aspects. Yet once the project is completed, the knowl-edge of operating with the organisation/ team goes with the freelancer. The client organisa-tion is unable to pass that learning onto the next freelancer, who will have to start from the beginning.

Added to this challenge was how most freelance AEs found their occupation to be lonely, and how issues of competition made open sharing high-risk with people who offered similar products. This isolation also made it difficult for adult educators to know where they stood in the wider market, how they compared with other trainers and whom they could reach out to for genuine support, which may have helped turn reflective thinking into transformational action.

With these challenges in mind and based on our project data, we summarised the types of dispositions and skills we thought necessary to navigate the daily life of a freelance AE, and also indicated the extent to which freelancers in different markets (captured by this study) possessed these elements. The dispositions required for success required AEs to be passion-ate, anchored, resilient and permanent learners. These are dispositions and skills that are on top of those required by all adult educators (pedagogic and course content), and focused

on the question of how to 'be' a freelance adult educator. The private sector-only freelancers were split into two groups because of apparent differences between more established AEs (those with more than five years of experience) and those trying to establish themselves (who had five years or less experience).

Overall, our freelance trainers appeared to be well placed in terms of having developed the dispositions to be effective AEs. This was important, as the extent to which learning took place was dependent on an individual's dispositions. All of the participants talked about passion in one form or another, using it for slightly different purposes depending on the challenges they faced and within the systems in which they worked.

In terms of being anchored to avoid fragmentation, experience, reflection and professional necessity appeared to be key elements. In the private market, it was necessary to know who you were, which is related to the skill of positioning and the nature of the market. Most experienced trainers went through a time of figuring this out. The reason why WSQ-only trainers exhibited less coherent 'senses of self' may have been because the system did not demand it, and the motivations of these freelancers were less tied to professional career drivers and more related to personal circumstances; for example, family or retirement.

The case of resilience was similar. Personal doubt and uncertainties about credibility and how work was allocated reduced the resilience of the WSQ-based and less established freelancers. Being anchored and resilient appeared particularly low for people who entered freelance training after being made redundant.

The disposition of being a permanent learner was reasonably strong for all respondents, which was likely related to the centrality of learning for this occupation. The effort of turning 'everything as a learning experience' into transformational actions, however, was less evident, largely due to time and/or a lack of support and motivation for truly reflective practice.

While the above dispositions appear to be reasonably well developed, the skills of freelancing appeared to be less so, particularly for the WSQ-based AEs and less established private trainers. The following discusses why this might have been the case.

The findings suggested that the WSQ-focused and less established freelance trainers possessed weaker planning skills and a poorer understanding of how to operate as a freelance trainer. This appeared to be related to both experience in previous careers, as well as experience negotiating (internally and professionally) as a freelance trainer. These skills were considered important as they could impact on being confident in the decision to freelance, as well as one's reputation and ability to attract and retain clients.

With small networks, high chances of direct competition and few proactive strategies, WSQ-focused and less-established private trainers were again in a weaker position to be highly mobile freelancers. Although formal platforms and social media existed for networking purposes, their functional usage appeared limited. This implied either that they were not marketed effectively or unable to offer the right connections. Motivations to engage these platforms may have been low or there were obstacles within these networks that were difficult for less experienced trainers to break through. The lack of a collaborative culture and the

difficulty some freelancers had in proving themselves also made it difficult for more inclusive networks to exist.

The implications of having poor positioning skills were felt mostly at the individual level as it made it hard to know how to market products and compete with credibility. It also affected a client's ability to judge whether they were worth engaging. On top of this, planning for professional development became more difficult without an area of focus, which increased the risk of wasting resources and threatened professional integrity.

'Shape-shifting' skills determined the ease with which freelance trainers navigated the diversity they experienced. These skills had implications for clients and providers, mainly because they helped freelancers link a product to client needs and deliver it appropriately, effectively and efficiently. The longer a freelance trainer took to 'figure out' a client, or the less transparent a client was, the more difficult a trainer's job became in terms of providing something meaningful.

The weaker innovative skills demonstrated by the WSQ-focused and less experienced freelancers indicated that the system (including client expectations) could easily stifle innovation and potentially encourage complacency among trainers with limited professional aspirations and standards. The impetus to put the effort into innovation and customisation appeared lacking in these freelancers, raising questions about reward structures, internal motivations and the types of products they could offer. The skill and drive to innovate were an important aspect of professional gratification for more experienced freelance trainers, and also pointed out the crucial relationship between the development and delivery of more responsive products.

Overall, it appeared that motivations, experience, strong networks and having access to more challenging, creative jobs were crucial for the development of the dispositions freelancers required, particularly the skills highlighted by the project. These factors were much more prevalent for freelance trainers operating exclusively in the private market or in combination with WSQ-focused work. This suggested that the system and the individual's ability to negotiate with it were crucial. The WSQ-focused trainers had more personal than professional motivations and experienced fewer 'stretch' opportunities as they operated in a system that was difficult to understand for the inexperienced, tended to be isolating and competitive, demanded competency rather than excellence, encouraged 'stand and deliver' rather than individualised and innovative educational practices, and was relatively poorly rewarded when compared with non-WSQ-focused providers.

Although the above emphasised the need to address the WSQ-focused and less experienced trainers, it did not mean that other types of freelance trainers perceived themselves as being 'the complete package', without further need of improvement. If anything, the more experienced freelancers were always striving to improve themselves, and importantly, appeared to have the dispositions and skills to do so. The challenges they focused on were more related to difficulty accessing existing funding mechanisms for either their own businesses or for clients to receive subsidies for high profile or non-WSQ training.

The above mentioned dispositions and skills were raised in our data as useful for freelance trainers who wanted to pursue their freelancing endeavours as a viable and rewarding profession. They were learned largely through experience, interaction, and reflection, which were related to the opportunities they experienced to develop their craft. The opportunities were influenced by the products they had the ability to offer and the environments in which they worked, including different organisational cultures, WSQ-based, non-competency based and/or free market systems. While the individual freelance adult educator was directly affected by the acquisition of these dispositions and skills in terms of getting work and gaining professional satisfaction, there were also implications for their clients, including providers, and the sector. The environments that clients and providers created for freelancers could enhance the freelancer's contribution or limit it, making it easier or more difficult for a freelancer to understand their needs and how to work, and could encourage sharing, collaboration, and innovation. At a sectoral level a free market appeared more able to encourage responsiveness and professionalism, where clients expected more from the freelance adult educators they engaged, while a system that focused on standardisation had a different agenda that may, on the one hand, have expected a certain level of competency from their adult educators, but on the other, did not appear to encourage or reward those who strived for more. This is not to say, however, that all opportunities in the free market were equally rewarding.

A key project deliverable was the creation of a learning note promoting the dispositions and skills suggested by the interview data and literature review (being passionate, anchored, resilient, and a permanent learner). The note was workshopped for clarity and ownership by the project reference group and other interested stakeholders. The final artefact was published online through the IAL website and an associated newsletter. The project findings were also disseminated for incorporation within the DACE programme, the AE Network and a range of IAL professional development activities. Again, the project findings quickly received attention from across the CET sector and related ministries.

6. Conclusion

The two research studies outlined are a small sample of many similar projects conducted across a wide range of public and private organisations employing skilled and unskilled workers in small, large and multinational enterprises. All projects have been enacted within the processes described in this chapter. Outcomes, too, have been and are being developed to maximise the accountability and community and labour market impact of the CWL as a publicly funded research centre. Over time the CWL, we believe, has contributed to the wider policy arena through normalising such concepts as 'lifelong learning' and 'workplace learning' that are now part of Singapore's popular discourse. The rapidity of the CWL's impact on the progressive direction taken by Singapore's CET sector can be largely attributed to its location or 'embeddedness' within the MOM (and post-2016 the Ministry of Education)

and its ongoing cultivated relationships with other ministries and statutory bodies. These relationships are forged on trust, familiarity and a reputation for delivering high quality and independent research with maximum pragmatic impact. It is a model of research that other countries could well heed.

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Roger Harris

▶ Enhancing Work-based Learning: Different 'Trainer' Roles, Different Types of Guidance?

1. Introduction

Interest in work-based learning (WBL) has expanded over the past three decades primarily due to the changing character of work and the 'rediscovery' of the workplace as a learning site (Harris, Willis, Simons & Underwood, 1998; Billett, Harteis & Eteläpelto, 2008; Fuller & Unwin, 2011). WBL has been identified as one of the top priorities for 2020 by 27 EU Member States, the five EU Candidate Countries and the three European Economic Area countries (IAG-TVET, 2015). Along with this interest, research on WBL has also increased, providing strong evidence for the collective nature of workplace guidance with the entire work community providing learners with support and assistance (Mikkonen, Pylväs, Rintala, Nokelainen & Postare, 2017).

Embedded in the title of this chapter are two premises and one question: that learning can be enhanced in a workplace, that there are available different sources of human support and the issue of whether the support varies according to source. In competency-based programmes, there is some combination of learning taking place at a worksite as well as in an educational institution of some type (Harris, Guthrie, Hobart & Lundberg, 1995; Hodge & Harris, 2012). In the Australian context, this is typically a mixture of learning in a workplace combined with learning in a VET institution, whether public (Technical and Further Education (TAFE)) or private.

The chapter explores these aspects, drawing on cumulative research in Australia undertaken by the author and colleagues. The focus here is on three studies which inform us about different types of support, synthesising their key findings on work-based learning. Study 1 examined host-employers and VET teachers, and the ways they worked with apprentices; Study 2 focused on informal workplace trainers working with fellow worker-learners; while Study 3 researched public VET teachers working in private companies with apprentices. The first two studies were quantitative and qualitative, the third qualitative only.

The theoretical lenses in these projects were learning network theory (Van der Krogt, 1998; Poell & Van der Krogt, 2003) and/or communities of practice (Lave & Wenger, 1991; Wenger, 1998), both of which can furnish valuable insights on WBL, providing different perspectives useful in understanding how learning is organised and how learning and work are related. The first theory conceptualises the workplace as a series of networks, of which two are of particular significance in understanding WBL. Work networks evolve from ways in which workers interact with policies, organise and work within an enterprise, and are shaped by the nature of the work and the relationships and climate created by the workers. Similarly, learning networks comprise the results of workers acting on policies, planning and developing ways of recognising the learning that occurs. The theory posits that these systems are held in tension with each other, though such tensions are not necessarily detrimental to learning. The second theory sees individuals moving across boundaries into a variety of communities of practice. A particular problem that newcomers experience as they enter a new community of practice is that they must 'get enough attention and create enough relationships with busy old-timers to gain access to the community and its practice. Only then can they start to become full participants' (Wenger, 1998, p. 100). So movement from one site to another can hinder development of legitimacy, creating problems that others in more permanent placements may not experience. It also makes complementarity between learning environments harder to achieve. However, not all movement between communities need be viewed as problematic. Communities of practice may be of different types. Engagements can be complementary or overlapping, and the theory holds that it is useful 'to belong to both types at once in order to achieve the synergy of the forms of engagement' (Wenger, 1998, p. 76).

2. Host-employers, VET teachers and apprentices (Study 1)

2.1 Policy context and research focus

The first study was undertaken within a national policy context of 'integrated, competency-based training'. Embedded in the training reform were moves to User Choice, Training Packages, New Apprenticeships and VET-in-Schools, the training market was being opened up, there was continuing questioning of the role of TAFE (the public training provider) and increasing emphasis on training in the workplace – and all of these winds of change kindled the embers of debate over training quality. Critical issues were being raised about the nature, roles and effectiveness of on- and off-job sites as learning environments.

We were therefore interested in what 'integration' – or 'complementarity' – meant and how it was perceived by various actors. Focusing on the building and construction industry, we researched through interviews, focus groups and a questionnaire survey the contributions of their on-job and off-job learning environments and how they were perceived to be complementary, or not (Harris et al., 1998).

The first phase involved 59 semi-structured interviews in South Australia with 32 apprentices, 21 host-employers and six VET teachers. A number of different purposes of on- and off-job training were gleaned from transcripts. The researchers clustered and refined these various purposes into explicit statements, which were further refined in the second phase after four focus groups (respectively, apprentices, graduates, employers, teachers) that followed up on emerging themes. These were then incorporated into the three questionnaires, to gather data on the purposes and usefulness of on- and off-job training. In the third phase, the Housing Industry Association network and contacts within TAFE systems were used to obtain samples in New South Wales and Western Australia of apprentices, their host-employers and their TAFE teachers. The questionnaires were piloted in Victoria with six respondents, then distributed within each state with follow-up two weeks later.

The apprentice sample totalled 76 (26% return rate). All were males, and 44% were in their final year. Collectively, therefore, they formed a group relatively well advanced through their apprenticeships and whose views could be expected to be underpinned by informed experience. The second sample comprised 73 host-employers (30% return rate). All were males and 87% were self-employed. They were an experienced group in terms of numbers of years working in the building industry and in numbers of years training apprentices. Ninety-three percent had worked in the industry for more than 10 years, while 55% had been training apprentices for over five years. The TAFE teacher sample comprised 103 (a 36% return rate). Most respondents (97%) were male, as would be anticipated in this industry. This group had long experience in building, with over three-quarters having more than 20 years of experience. In addition to this experience in industry, they also reported extensive periods in the role of trainer/teacher, with one-half having been teaching for more than 15 years.

2.2 What did we learn about enhancing WBL?

Apprentices are exposed to two primary learning environments: worksite and training provider. Although the aim of each site is to train apprentices to an industry level of competency, tensions exist as each site has its own priorities and concerns. The formal, institutionalised training provider sees the outcome as being of benefit for the individual apprentice and for the industry as a whole. The small to medium-sized business, however, is concerned over survival as a productive enterprise and guides apprentices' practical learning with that in mind. The apprentices hover between these learning sites, and as they move from one to another, they are required to adjust to the demands of the workplace and college, reconciling the roles of apprentice-worker and student and juggling the messages from each environment (Table 1). They are constantly being challenged to use and make sense of the learning they undertake in each environment and are continually involved in the process of attempting to integrate the learnings from each site. Irrespective of any activities planned by employers or teachers, it is ultimately the apprentices who are challenged to make sense of their own learning. From this study, we found that difficulties in the implementation of training reform have arisen less at the structural level and more at the human interface, and its architects

have not adequately accounted for how the actors and stakeholders perceive changes and work or do not work with them (Harris, Willis, Simons & Collins, 2001).

Table 1: Respondents' perspectives about on- and off-job contributions to learning	
On-job:	**Off-job:**
▶ Real-life setting	▶ Where 'the essentials' are learnt
▶ Experience range / depth	▶ Provides the 'why' – principles behind activities
▶ Contextualises off-job	▶ Non-pressured setting
▶ Where 'trained tradespeople' are located	▶ 'A balanced approach'
▶ Where 'apprentices become tradespersons'	▶ Broader understanding of trade and industry
▶ Provides motivation	▶ 'Non-hands-on skills'

Differences between the learning environments inevitably spring from varying emphases on intent and vision. They are to some extent complementary, to some extent in conflict. There is an inherent tension in purpose. While these contrasts indicate essential differences in the learning environments of the two sites, the key issue for the effectiveness of apprentice learning is the degree of 'fit' between the environments – whether learnings at one site contribute to learnings at the other and are perceived to be complementary. Integration of both types of learning within the apprentice takes time and the active support of mentors from both environments. These mentors of learning in both sites need to account for the positives and negatives of tensions in structuring their environments. Failure to do so results in training arrangements that promote confusion and leave the task of 'fitting' often contradictory learnings together to chance or, at worst, conflict.

We found that integration of learning was enhanced when the apprentice could apply the basics to new situations, and when the learning contributed to their working more effectively with the host-employer and did not disrupt the workplace routine to any large extent. Thus the notion of integration has an *individual* dimension, in this case referring to the synthesis process occurring in the minds of each apprentice. It is within the apprentices themselves that integration takes place. Their experiences from one community of practice to the other are combined to form an integrated knowledge of theory and practice, and at the same time they are growing in identity and legitimacy (Harris, Simons, Willis & Carden, 2003).

Moreover, they play the important role of 'broker', albeit often unintentionally, transporting information and knowledge from one site to the other. How much they are 'heard' is a moot point. Given the high potential for lack of communication between them, stakeholders need to listen carefully to their apprentices; as the sole common factor, only the apprentice is in a position to hear the different perspectives and mediate between them. Apprentices must work hard to make sense of these varied influences and to juggle the sometimes complementary but often contradictory messages from their different learning environments.

In summary, what we learned from this study about enhancing WBL was that:

▶ different sites of learning have their own cultures, communities of practice and interests

▶ the workplace nearly always wins out – by virtue of its authenticity, amount of time spent in it by the learner, and immediate relevance

▶ learning depends on the nature and quality of the guidance (especially from the workplace) and the degree of complementarity between different learning sites

▶ degree of complementarity depends on the understanding and willingness of all parties to put aside their own vested interests for the good of the apprentice's learning

▶ integration of learning is more dependent on the apprentice than any policy or architecture that may be put in place by the organisations.

These key findings motivated us therefore to examine in greater depth what was actually happening inside companies.

3. Informal workplace trainers and fellow workers (Study 2)

3.1 Policy context and research focus

The policy context around the time of the second project was on quality of VET provision and building workplace training culture, and so we considered that more research was required into the role of the workplace trainer in these processes. National competency standards for workplace trainers was one of the key initiatives by the Australian Government. While there had been work on formal trainers, there was little on informal trainers, so our study researched the role of informal workplace trainers. We wanted to identify what they actually did to enhance WBL, and the extent to which their actions aligned with the national competency standards (Harris, Simons & Bone, 2002; Simons & Harris, 2009).

The research was in two phases, qualitative and then quantitative. The first phase involved observations and interviews in 18 enterprises where informal workplace trainers were facilitating learning with one or two employees/learners. The working definition for this research was: 'the person in the enterprise who helps/guides others to learn the things they need to know and do in order to get their work done'. The three industries selected were information technology (a relatively new and growing industry experiencing rapid change), real estate (where is no well-established, pre-service training, and most training is on the job) and building and construction (an industry with a more 'traditional' approach to training).

For each industry, enterprises were selected from South Australia, New South Wales and Victoria. There were six enterprises in each industry, with selection spread across the three states so that six companies – one large, two medium and three small – were observed in each state. Researchers used an observation schedule to record actions of the trainer as well as the

interaction between trainer and employee, and where possible and with permission, verbal interactions were audiotaped. Following these observations, trainers were interviewed using a semi-structured interview schedule. A total of 29 observations and interviews were held, and three sources of data were garnered: transcripts of interviews, transcripts of training episodes and researcher's field notes on observations of sites.

The second stage focused on a telephone interview survey of a larger sample of enterprises across the same three states. This survey aimed to gather data to complement the information from the first stage, particularly focusing on the 32 trainer actions and on trainer characteristics. Interviews were conducted using the Computer Assisted Telephone Interviewing system at the University of South Australia, and were held with a random sample of enterprises drawn from the Desktop Marketing Systems database. Trained interviewers conducted all interviews and the data collection process was monitored to ensure the quality of data collected. A total of 350 interviews were completed, one in each enterprise, with a person selected by the enterprise to match the working definition.

Interviewees, by organisational size, were 46% in micro, 31% in small and 23% in medium/large companies; and by industry, 33% in building and construction, 36% in information technology and 31% in real estate. They reported a wide spread of experience in working in their particular industry. Forty-five percent (n=156) stated that they were the owner, reflecting the purposefully high proportion of micro and small enterprises in the sample. While experienced in terms of working years, the proportion of the sample who had had exposure to workplace trainer courses was relatively small. However, these small proportions were expected given that researchers were specifically seeking the more 'informal' workplace trainer rather than the formally trained person dedicated as a 'trainer'.

3.2 What did we learn about enhancing WBL?

Informal workplace training is very common, judging from the overall frequency of trainer actions reported by respondents (Harris et al., 2002, pp. 33–36). The highest frequencies reported were those reflecting the trainers' keen interest in employees' concerns. Examples of these actions are presented in Table 2.

Table 2: Ways in which informal workplace trainers showed interest in employees' concerns	
Examples of actions	**Percent of sample reporting actions taken 'often'/'very often'**
▶ Talking with the employee while working with them about what they are doing	88
▶ Giving feedback and encouragement to the employee about their work performance	78
▶ Making time to talk with the employee about their work	75
▶ Encouraging employees to share their knowledge and expertise with others	73
▶ Listening to the employee about any concerns or difficulties they might be having in the workplace	72
▶ Doing a job with an employee to be able to help them with tasks	71
▶ Telling the employee stories (e.g. what has happened in the past, interesting things about the job, etc.)	70
▶ Helping the employee to work out problems that occur in the workplace	70

Arguably the most striking aspect, however, was the extent to which workplace trainers structure and shape work processes to accommodate learning. In small and micro businesses, the informal workplace trainer, in conjunction with other workers, shapes the learning network that evolves. An effective workplace trainer is aware of the impact of the work network on learning in their enterprise and how the work network can be shaped and reshaped by their actions in supporting learning. The workplace trainer has a key role to play in helping to alter the 'shape' of work structures, processes, relationships, content and climate to accommodate learning. Some of the ways in which this is achieved are displayed in Table 3.

Table 3: Ways in which informal workplace trainers structure/shape work processes	
Examples of actions	Percent of sample reporting actions taken 'often'/'very often'
▶ Monitoring the workflow and quality of the employee's work	79
▶ Organising work so that the employee can be given tasks they can tackle on their own	76
▶ Managing the flow of work so that it helps the employee to learn what has to be done	71
▶ Planning the structure of work so that the employee is able to join in and work at a level best for them	66
▶ Organising work so that the employee is able to tackle a variety of tasks	65
▶ Making judgements about how to balance the need of the employee to learn the job and the need to get the job done	64

Many of the informal trainer 'actions' varied significantly by industry. For example, in building and construction, trainers focused, more than in the other industries, on the *work performance* of employees, which may have to do with the traditional culture in many of those companies in which learning is not so valued as in other industries. In contrast, trainers in IT companies engaged *less in structuring* employees' work for learning, probably because IT work, based around project work, already offers many such learning opportunities. Trainers there focused *more on organising resources* for employees. In the real estate industry, trainers frequently organised work so employees could spend time with other workers. Possibly the less hands-on nature of the work in this industry enables the room to manoeuvre for this type of activity. So the findings indicated that the frequency with which many trainer actions are undertaken varies significantly between types of business. The nature of the work leads to different kinds of trainer roles being played.

Further statistical analysis (Poell et al., 2006) unveiled several other aspects about the role of these informal workplace trainers. First, the 32 actions in their work could be clustered into three main 'role dimensions': actions to support learners in learning (Support), actions aimed at structuring the work of employees for learning (Structure) and actions focusing on employee work performance itself (Performance). These were the three ways in which these trainers were contributing to work-based learning. Second, three types of workplace trainer holding different 'role conceptions' emerged from the data: a small group (13%) with a passive, indifferent role conception, a considerable number (38%) with a restricted role conception, and a large group (49%) with a broad, active role conception. The passive group provided little support, offered little structure and paid little attention to employee work performance; the restricted group offered little structure, and average support and attention to

performance; while the active group provided considerable support and structure, as well as emphasising performance. Thus, in terms of their role conceptions, the third type had most in common with formal educators. Interestingly, unlike the other two types, many informal workplace trainers with a broad, active role conception had been exposed to at least one formal preparatory course.

Third, the roles these workplace trainers played were related to a number of personal and organisational characteristics. For example, the more years of experience they had as an informal workplace trainer, the more they structured employees' work for learning. This could be because their overview enables them to organise highly effective work-based learning opportunities for employees. Furthermore, informal workplace trainers who were owners showed higher levels of support, structure and focus on performance than non-owners. The same was true of informal workplace trainers who had been exposed to at least one formal preparatory course, compared with those without any preparation. In both instances, this was probably due to these informal workplace trainers having been triggered to pay explicit attention to the way in which they developed their employees or colleagues, and in the case of the owners, having the authority to do so.

No relationship was found between role dimensions and enterprise size, indicating that the levels of support, structure and focus on performance of informal workplace trainers are independent of company size. This may be because their developmental relationship with an employee is mostly a one-on-one interaction not influenced by organisational scale.

We also found that most informal trainer 'actions' did not directly match the Australian competency standards for Assessment and Workplace Training. Our critique of these national competency standards revealed a number of assumptions underlying them. One, they reflect a particular view of the workplace trainer, characterised by a notion of training as formal, structured, delivered, assessed, recorded and certified, yet a substantial amount of training occurring in the workplace is of the unstructured, informal kind, particularly in micro and small businesses. Two, they have an overwhelming emphasis on *training* rather than *facilitating learning,* and formalised on-site training almost to the exclusion of informal learning. And three, there is an implicit assumption that the trainer knows best, has the legitimate authority and is the one with the 'right' knowledge and skill. Thus, we concluded that these competency standards tend to be *acontextual*, framed *in vacuo* without much reference to the workplace, and that there is a need to put 'work' back into notions of 'workplace trainer'. Our findings challenged the notion of 'one size fits all', as various types of trainers in different enterprises develop different ways of working – the work shapes the learning, and the learning network shapes the role of the workplace trainer.

The key findings from this study that informal workplace trainers seem to perceive a variety of roles for themselves based on their actions in supporting employee learning led us, in keeping with learning network theory, to examine how external bodies influenced and shaped learning in companies. The theory focuses on the influence of professional associa-

tions on organisational learning; however, here we extended the theory to incorporate also the active involvement of 'external' VET teachers within enterprises.

4. Public VET teachers in private companies (Study 3)

4.1 Policy context and research focus

The national policy context of building partnerships between VET and industry catalysed the third study which investigated through six case studies how public VET teachers worked in and with private enterprises to enhance WBL (Harris, Simons & Moore, 2005).

The research focused on a range of industries – hospitality, retail, transport, wine and automotive. These were chosen because they represented a blend of traditional and emerging industries, and were likely to exhibit different organisational characteristics. The study involved six case studies, three Victorian and three South Australian, each comprising a VET provider and an enterprise where there was a linkage. The case sites were therefore spread across a number of locations, industries and institutes as well as a range of enterprises, thus providing diversity while recognising the need for compromise because of time, funding and the intensive nature of the research methodology.

The institutes identified a VET teacher who was working with a private enterprise. These teachers and their managers were invited to participate in interviews. A similar process was used to seek participation from the enterprises, in particular the participation of those who were most familiar with the *modus operandi* of the VET teachers – namely, training staff and worker-learners. In this way, the research was made more robust through the triangulation of data sources.

A total of 34 interviews were completed through the study. Nine occurred on the pilot phase in New South Wales, with four teachers and three managers in three TAFE institutes, and one enterprise member. In Victoria and South Australia, 26 face-to-face interviews were held within institutes with VET teachers and managers, and wherever possible within enterprises with company members and worker-learners in contact with the VET teacher. In the six institutes, six teachers and five managers were interviewed, while in the six enterprises, interviews were held with seven company members and eight learners. In this phase, 14 interviews were with males and 12 with females. The interviews were recorded and transcribed, and summaries of visits and interviews were made using field notes.

4.2 What did we learn about enhancing WBL?

The research identified a number of critical challenges that VET teachers face in enhancing WBL in companies. Here, five are highlighted (for further analysis, Harris, Simons & Moore, 2005).

Building legitimacy

Unless a VET teacher is going to remain in one enterprise for a long time, it is not likely that they will move from the periphery to the centre of the community of practice in an enterprise in an unproblematic way. They are not likely to possess the 'soft knowledge' held by an enterprise – the non-codifiable, often tacit, knowledge and practices reflected in sayings like 'This is the way we do things here'. Teachers need to be able to access such knowledge and practices at the same time as bringing in the social, cultural and intellectual capital desired by the enterprise. This means that the teacher needs to build relationships with key people in the workplace and spend time 'getting to know' the enterprise.

Some strategies that teachers used to build legitimacy and effective relationships in workplaces included:

▶ being responsive – one workplace trainer said, 'You have to understand the culture. Everything we do in our training is about changing cultures and learning skill developments, so she needs to understand where the culture is; I mean that from a workplace culture point of view.',

▶ negotiating what they will do,

▶ establishing regular meetings with staff to ensure relevance of their work,

▶ sharing the teaching/training role with workers,

▶ following up and seeking feedback,

▶ customising training and assessment materials and approaches,

▶ drawing on their previous industry experience, knowing how to behave and interact with different groups of workers in the workplace.

Crossing the boundaries between the workplace and the VET institution

The work on communities of practice raises the importance of boundaries where learning communities intersect and the importance that connection plays in generating learning. Learning arises because there is a shared focus (e.g. legislative compliance or commitment to quality). There is also an acknowledgement of the similarities and differences that exist between communities and a willingness to engage in ways that makes communities accessible to each other.

For VET teachers, the key to crossing boundaries is engagement with the culture of a workplace and working with it, rather than injecting their own ways of working. In effect, teachers are challenged to view the workplace as a community of practice in its own terms, *not* in terms of what it lacks simply because it is not a formalised learning site.

Some of the strategies employed by teachers to build bridges across these 'two worlds' were:

- ▶ being sensitive to the demands of workplaces primarily as sites of production and only secondarily as sites for learning,

- ▶ serving as examples of learners to workplace colleagues,

- ▶ developing high level knowledge and expertise in the current needs of industry,

- ▶ actively working to customise and 'translate' artefacts from the institute environment into resources that can be of value to the company (e.g. new training processes and/or assessment tools). One respondent called this 'tweaking to suit company needs'.

Managing power relationships

We found that moving from an institute to a workplace as the site for work alters the practices of teachers (Harris & Simons, 2008). They can be perceived as increasingly 'absent' from their institute, which can cause conflicts! Issues related to the exercise of authority over decision-making can also be raised between teachers and their institution-based managers. There can also be tensions between teachers and company managers – over issues relating to control of learning processes, or amounts of attention teachers direct towards different groups in an enterprise – for example, workers versus managers. Here the role of the VET teacher can be particularly conflicted. One the one hand, they are required to support the workers who are also the learners; on the other, they are required also to provide support to managers. Teachers need to be able to reconcile sometimes contradictory expectations on their time and efforts in order to minimise the possibility of role conflict.

Learning how to meld their support and guidance with the natural 'flow of work'

A very important aspect of their working in enterprises was meshing with regular work patterns and not disturbing the natural flow of work. Almost all interviewees referred to the difficulty of workers being available for learning, and so fitting in around their work in terms of timing and selecting modules that matched their individual work patterns were crucial ways to keep learners motivated.

The TAFE teachers had to learn how to meld what they did with the regular patterns of work, and learn if and when to intervene. In the words of one teacher,

> I'm pretty switched on about what they expect of me and what they expect of their workers, so I try not to interrupt their flow of work to any great extent. I try to fit into their flow of work and if I have a problem with trying to get people out of the workforce to do a particular unit and it is not something that will flow in with their activity …, then I'll go and talk to the manager and say, I've got this problem, I need this person to come out of there or is there something else I can do to fill my time.

Such adjustment draws attention to the tension between work networks and learning networks and how in this tension work has priority over learning. This example illustrates a high level of understanding on the part of the TAFE teacher as well as a high level of ability in being able to accommodate endeavours to facilitate learning with the imperatives of work.

Creating a 'third space'

What we found was that, in terms of learning network theory, the overlaying of an external learning system on existing learning systems in companies brings inevitable tensions that need to be carefully managed. VET teachers working in industry operate in 'two worlds' with very different cultures. In boundary crossing, what was important was not simply the transfer of intact knowledge and skill between contexts, but that in the process of transfer, knowledge and contexts were being altered.

They were in essence creating a 'third space' (Gutierrez et al. in Engeström 2001, p. 135) or a 'third way' (Bottrup, 2005, p. 508) in which new meanings could be, and had to be, constructed that went beyond the constraints of either site. They were inhabiting a new space, between the public and the private, between VET institutions and companies, and between learning and work (Harris & Simons, 2006). These TAFE teachers served as bridges between public training and private industry. As such, they were links between quite markedly different cultures, where there was the potential 'to help and learn from each other' (VET teacher). They were representatives of the middle ground, in the words of one teacher the 'meat in the sandwich', a role that only they could play because of their unique backgrounds and experiences. They were people who were often thought of as one of the company staff, as having a closer fit with industrial culture than with educational culture, even though they now worked for the public sector. They had left one sector and 'defected' to the other, and in this position of having experienced both cultures, were uniquely fitted to the roles they were now playing. Their role was as learning brokers, not simply content-trainers but changing learning cultures and adding value to the learning systems in companies. They were boundary crossing.

In other literature, Nonaka and Konno (1998) have written about *Ba* – the Japanese concept of a shared space for developing individual and collective knowledge, Hytönen and Tynjälä (2005) draw parallels with Vygotsky's zone of proximal development – that in collaboration one can advance to higher level outcomes than by working alone, and Bottrup and Clematide (2005) refer to the notion of 'learning space'. The underlying idea in such arrangements is that individuals or groups crossing borders, say between organisations as in these cases, can promote learning through the stimulation of dialogue and reflection. In this way, knowledge creation is fostered through collaboration and participation and through the making explicit of informal knowledge in contexts other than one's own.

Yet the VET teachers' ways of working were certainly not unproblematic. These external agents had much other learning to do, something most had not necessarily appreciated when they first started working with enterprises. Their learning had to be far deeper and more

subtle than merely learning about company processes, employee gaps and training content. These were certainly important in order to be visibly effective and to win credibility, but most importantly, they also had to learn:

▶ about company culture and environment,

▶ that it took time and energy – to win friends and influence people, to sell their wares to initially resistant and sceptical workers, and to plug learning gaps before beginning to build a broader learning culture,

▶ that timing of learning episodes was not necessarily of their own making,

▶ that many worker-learners were reluctant/resistant to learning,

▶ to be patient, meeting immediate needs first, then moving onto a broader mission,

▶ to be flexible, changing their methodologies to fit with the 'in your face' environment of industry – to be less lecturer and classroom-like, and more interactive,

▶ to customise their materials to resonate more closely with the industry environment.

5. Concluding insights

The findings from these studies highlight that not only are learners engaged in WBL guided by a variety of other personnel but also that there are qualitative differences in the types of support available to learners. Company-based personnel are involved in *both* the work networks *and* the learning networks of an enterprise, and are members of established communities of practice, factors which greatly influence both the nature of the role and degree to which they are able to fulfil it. Informal workplace trainers can provide different forms of guidance than formal trainers, given their support is likely to be unstructured, incidental and more deeply situated in the actual work of the company. Work shapes the learning, and the learning network shapes the role of the workplace trainer.

In contrast, provider-based teachers are *not* situated within an enterprise's work network, and with the need to take time to establish trust in the enterprise's learning network and to work their way into a community of practice, necessarily play a quite different role. 'Outsiders' are in a different position from 'insiders'. They are considerably less affected by the potential constraints of intra-company networks than enterprise-based trainers, and can bring fresh, unencumbered insights that can be valuable to a company preoccupied with its own economic concerns. However, they are also likely to be restricted in having more limited understanding of the structures, processes, relationships and values of the workplace – that is, lacking soft knowledge.

The other form of support is the important role of learners helping other learners. Here, the support is different again. In Study 1, one of the key advantages of going offsite to an external provider was reported to be the intermingling of apprentices from other companies

where they could learn from each other through knowledge exchange. In these instances, the learner is likely to feel less vulnerable being helped by a peer than in admitting limitations to a workplace trainer or fellow worker, let alone a workplace owner. Moreover, learner-to-learner communication is likely to be employing the same language, in their own words and at the appropriate level.

There are therefore important differences in the types of support and guidance that can be given by different helpers in WBL. However, the one clear and common message from those studies is that, whatever model of support and guidance is used in WBL, it is largely shaped by the *personal relationships* built between VET personnel and key players in workplaces. In the words of one VET manager in Study 3, 'The shades of what arrangements you can come to are only varied by the nature of people's arrangements with each other.'

These studies stimulate many lines for further research on WBL. How can/does close collaboration between on and off-job sites, so necessary for effective (integrated) training, best happen? How can greater efforts be made to build 'learning communities' where all learn from one another and are pro-active in learning? In moves to re-emphasise the workplace as a learning environment, there is an urgency to investigate who becomes a workplace trainer, and how, and what makes that person an effective workplace trainer. Further research is also needed into how provider-based trainers might best work with the learning and work networks in enterprises, and how external bodies influence and shape these networks over time. Another area deserving attention is the quality of learning networks in enterprises, potentially using the dimensions of content, processes, structures, relationships and climate as the basis for examination. There is also a need to investigate ways in which informal training/learning in the workplace might be more fully recognised and valued, together with ways of framing policies to reflect what happens in reality so that people are able to receive recognition for their learning. Furthermore, research into the 'third space' being created by VET teachers working in and with companies would be helpful, such as its nature and the ways the role is qualitatively different from company-based and institution-based personnel. All of this inquiry would advance the research agenda of work-based learning, so critical in the modern VET space.

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Part V:
Boundary Crossing: Transfer and Recognition of Knowledge, Skills and Competences

Natasha Kersh

▶ Learning from Knowledge Transfer and Recontextualisation of Experiences in the Context of Workplace Learning: Insights from the UK

1. Introduction

This paper focuses on the way that individuals cross boundaries and transfer knowledge between contexts and spaces in work-related settings, particularly focusing on the experiences of further education (FE) tutors in the context of the UK. Learning through boundary crossing and knowledge transfer in the context of vocational education and training (VET) has been recognised as an important area of work-related learning research (Guile, 2010; Bakker et al., 2011; Edwards, 2011; Evans et al., 2006; Tuomi-Gröhn & Engeström, 2003). Within the VET context, transferring knowledge through bringing together its different types (e.g. work-based, personal, subject-based knowledge) has emerged as a significant aspect of vocational pedagogy. The fundamental principles of vocational pedagogy have often been considered within the concept of 'learning through boundary crossing' within and between the contexts of education and work (Guile, 2010; Bakker et al., 2011; Edwards, 2011; Evans et al., 2006; Tuomi-Gröhn & Engeström, 2003).

The interplay between learning, working and personal spaces has been characterised by their somewhat blurred boundaries, where boundaries and spaces are multifaceted and multidimensional (Kersh, 2015). Boundaries have often been described as spaces and contexts with affordances for learning (Harris & Ramos, 2012; Edwards, 2011; Kersh, 2015). Crossing the boundaries across a range of spaces at work, such as physical, virtual or informal, enables individuals to navigate these spaces while learning and using their skills and applying knowledge within their environments. Research suggests that engaging in learning and applying skills not only within, but across, a variety of contexts involves recontextualisation of skills and knowledge across these contexts (Kersh, 2015). In this discussion, the concept of recontextualisation will be employed for a better understanding of boundary crossing in

work-related settings and the ways that FE tutors use different types of knowledge in their teaching practices, thus aiming to enhance vocational pedagogy.

In order to illustrate the ways that college tutors draw on their knowledge and skills in a range of settings, this paper draws on a review of related projects dealing with issues of boundary crossing and knowledge transfer in the VET context, such as 'Working Places as Learning Spaces', 'Impact of Poor English and Maths Skills on English Employers' and the 'Post-16 Teacher Development Project', carried out at the UCL Institute of Education. Data collection has involved undertaking semi-structured interviews with tutors teaching in VET-related settings, including FE colleges and workplaces. Within the three projects, 15 interviews with tutors and practitioners teaching in VET settings have been completed. In addition, ten interviews with VET students have been carried out, as part of the 'Post-16 Teacher Development Project. The data from these projects have indicated ways in which individuals bring together different types of knowledge through boundary spaces that emerge from different practices and experiences.

2. Theoretical considerations: Recontextualising knowledge and experiences through boundary crossing

The forms of learning that can occur at the boundary of social practices (Guile, 2010) have been the subject of interest in a number of national and international studies (Star, 2010; Säljö, 2003; Young et al., 2003). In the literature, the concept of 'boundary crossing' has been used to advance knowledge and understanding of vocational pedagogy and the ways that learners acquire and use their knowledge and skills across different contexts and settings. Vocational pedagogy and the significance of different configurations of 'learning in, for and through the workplace' (Evans et al., 2006) have been discussed extensively in a number of recent research publications (e.g. Aspin et al., 2012; Malloch et al., 2011; Evans et al., 2006; Boud, 2006; Guile, 2010). The notion of 'learning through boundary crossing' within and between the contexts of education and work has often been employed to illustrate the ways that individuals endeavour to enhance the teaching and learning process in VET settings (Young et al., 2003; Guile, 2010; Akkerman & Bakker, 2011).

The complex interdependencies between learning spaces, knowledge transfer and boundary crossing have been considered through different theoretical lenses. Bakker et al. (2011) note that in sociocultural and cultural-historical theories, challenges in communication between practices are often conceptualised in terms of boundaries. Activity theory (Engeström, 2004) as a 'theoretical lens' has been employed to analyse workplaces and their boundaries as being characterised by their own object of activity. In the literature, boundaries have often been perceived as 'spaces' with potential for learning (Harris & Ramos, 2012; Edwards, 2011).

Within the VET context, transferring knowledge through bringing together different types of knowledge – in ways that meet the requirements and expectations of the learner, the

college, the employer and the awarding and professional bodies – is considered to be one of the most significant underlying principles that permeates the notion of vocational pedagogy. The strategies that provide a foundation for the implementation of this principle across courses are based on the concepts of boundary crossing, transfer and recontextualisation (Guile, 2010). As argued by Edwards (2011), boundary spaces emerge when the resources from different practices are brought together to expand the interpretation, perception and understanding of a task. The interplay between learning and working spaces (e.g. the college and the workplace) has been characterised by their somewhat blurred boundaries, where boundaries and spaces are multifaceted and multidimensional. Individuals' personal, working and learning spaces enhance their effectiveness, creativity and social practices, as they acquire, use and apply a range of skills across different contexts, within the boundaries of constantly changing contemporary spaces (Kohlegger et al., 2013). Harris & Ramos (2012) employ the concept of 'boundary crossing' to illuminate this movement of learners between different sectors and settings, specifically drawing attention to learning across contexts. Settings and contexts play an important part in knowledge creation and development. For knowledge generated and practised in one context to be put to work in another, it has to be transferred in various ways that simultaneously engage with and change those practices, traditions and experiences (Evans, Guile & Harris, 2007). Guile (2010) further draws attention to boundary crossing within and between the contexts of education and work, specifically considering the ways that students learn through work experience, making a point that this requires educational institutions to provide opportunities for students to apply the concepts from their formal education to interpret the reality of workplace cultures and practices and, vice versa, relating everyday experiences to more formal bodies of knowledge. Equally, as Guile (2010) further notes, it involves workplaces allowing students to participate in 'communities of practice' and supporting them to negotiate their own learning in those 'communities'. These strategies are essential if students are to develop the polycontextual skills, i.e. the ability to relate the interests and needs of one community to another, that are associated with boundary crossing within and between the contexts of education and work (Guile and Griffiths, 2001). The term boundary crossing, , refers to the process of 'negotiating and combining ingredients from different contexts to achieve hybrid situations' (Engeström et al., 1995, p. 319). Akkerman (2011) further identifies two important issues about learning, knowledge transfer and boundary crossing. The first is that boundaries are an important condition for learning because they support us to develop, for example, domain and cultural traditions, thus facilitating human understanding. The second issue, which follows from the first, underpins the role of educational institutions and workplaces in supporting people to learn at the boundaries of social practice. Similarly, Young et al. (2003) make a link between the concept of 'learning through boundary crossing' within and between the contexts of education and work, and the development of vocational education and its practices. Such boundaries, as helpfully noted by Akkerman and Bakker (2011) can be crossed by people, by objects and by interactions between actors of different practices.

The notion of boundary crossing and knowledge transfer has also been used and applied in order to develop collaboration and share good practice across VET contexts and settings. A significant configuration of knowledge transfer and boundary crossing has been associated with the development of modern technologies, which allows learners to extend their learning spaces to a variety of environments, including home and workplace settings. The expansion of digital technologies provides learners with opportunities to access and undertake learning activities in a range of other settings, including home, college and workplace environments, public libraries and youth centres. Felstead and Jewson (2012) observe that the recent developments in information technology have weakened the spatial fix, with workers and learners becoming increasingly detached from personal cubes of space, thus facilitating the crossing of boundaries between different contexts. The use of devices such as computers, laptops, mobile phones and netbooks has contributed to the development of the virtual learning space where learning might not be associated with a specific place or a specific time. The virtual learning environment provides a degree of flexibility for learners, enabling them to acquire learning at a time and place convenient for them. The use of new technologies and mobile learning has been gradually changing approaches to and ways of teaching and learning within the VET context. Crossing boundaries and transferring knowledge and skills across a range of contexts presupposes these skills and knowledge to be adapted, deployed and used in the new settings. One way to approach understanding and explaining the challenges associated with boundary crossing is, as Guile (2010) argues, through employing the concept of 'recontextualisation' as it offers a unified perspective on the role of lecturers and employers in moving knowledge into courses, as well as on lecturers and employers and learners engaging with that knowledge in college environments.

Settings and contexts play an important part in knowledge creation and development. As Evans, Guile, and Harris (2007) note, all knowledge has a context in which it was originally generated. Contexts are often referred to as settings or places but they could also extend to 'schools of thought', traditions and norms of practice, and the life experiences in which knowledge of different kinds is generated. For knowledge generated and practised in one context to be put to work in another context involves the crossing of boundaries between such contexts, and further presupposes knowledge recontextualisation in various ways, which simultaneously engage with and change those practices, traditions and experiences (Evans et al., 2007).

The term recontextualisation, which has to do with extracting meaning from its original context (decontextualisation) in order to introduce it into another context, was first developed in the sociology of education (Bernstein, 1961; 1990). Bernstein's concept of recontextualisation had a profound influence on sociological research on education. A number of researchers have drawn on this concept in order to develop a research framework (e.g. Leeuwen, 2008; Guile, 2010; Harris & Ramos, 2012). Recontextualisation, which involves discourse being transferred from its place in fields of knowledge and relocated in a new context for the purposes of transmission and acquisition, is a multifaceted concept. It refers to

the idea that knowledge, skills and practices change as we use them in different settings. Each of our expressions of recontextualisation sheds light on some element of the challenge of relating subject-based and work-based knowledge in real-life programmes (Evans et al., 2007). Mannion and Miller use the term recontextualisation to explain how people carry out known activities in new contexts or develop new patterns of activity to solve problems in new contexts (Mannion & Miller, 2005):

> Because we continually identify across contexts in any one moment, recontextualisation is seen as the process of participating in any number of contexts while concurrently changing that context through making sense of it out of experience of other situations, past and present (Ibid, p. 5).

The research of Evans et al. (2007) identifies four types of recontextualisation: that of content, pedagogy, workplace and learner. Pedagogic recontextualisation refers to the design and organisation of the teaching and learning dimensions of programmes. As Evans et al. stress, disciplinary knowledge is combined with practice-based knowledge that goes beyond specific jobs, and with local company knowledge. Pedagogic recontextualisation involves teachers, tutors and trainers making decisions about how much time they devote to, and what strategies they use to explain the background to, different forms of knowledge (Evans et al., 2007).

Interviews undertaken as part of our fieldwork indicate that educational professionals perceive teaching as a constructive and co-constructive process that requires continuous boundary crossing between a range of settings and contexts, both past and present. Different types of knowledge, skills and experiences are being recontextualised in their work environments, thus contributing to the development of their unique approaches in their teaching practices. The process, as our data indicate, involves crossing boundaries between past and present experiences, i.e. transferring previously acquired knowledge and skills, including:

▶ Subject-specific stored knowledge, learned and developed through both past and present learning experiences;

▶ Personal experiences and skills, which also refer to individual biographies and dispositions; and

▶ Workplace-related skills, acquired as a result of engaging in workplace learning both formally and informally.

3. Drawing on subject-specific data in teaching practices: Crossing boundaries between previously acquired knowledge and current teaching practices

Loo notes that curriculum knowledge is part of teachers' 'tools of the trade', like knowledge of materials, which can be used in class. General pedagogical knowledge refers to strategies and rules around classroom management and organisation. With pedagogical content knowledge, it is a combination of content and pedagogy, which he saw as unique to this profession. Loo (2006, 2011, 2012) further argues that one outcome of the teaching process is that students are taught something which may be based on data, facts and stored knowledge in order to achieve an academic goal. The way they receive this knowledge is the task for each lecturer to decide how it is best disseminated and delivered to suit the group and individuals within the group. I suggest that previous work experience will ideally colour this process, while ongoing teaching experience may well allow for innovative adaptations of delivery. As a result, subject-specific knowledge delivery is not simply a mechanical reproduction of various kinds of information and facts in the classroom. As our interviews indicated, the process involves crossing boundaries between the context where the knowledge has been acquired and the context where the knowledge needs to be delivered and passed on to someone else within the teaching and learning context. Therefore, subject-specific knowledge needs to be embedded and recontextualised in teaching practices. The way that subject-specific knowledge is recontextualised in the classroom depends on many different factors, such as types of learners, classroom context, available resources, number of learners in the class and the extent to which disciplinary knowledge needs to be contextualised in practical activities.

Other important factors that influence the way in which subject-specific knowledge is recontextualised in the classroom have to do with the personality, skills, experiences and dispositions of the teacher (practitioner). The way that subject-specific knowledge is delivered to learners depends on the tutors' teaching approaches and strategies. As noted by one of our respondents:

> There are a number of different ways you can teach the same discipline, the same topic, the same subject, depending on a particular context. You look at the context, and sometimes your intuition helps you to find the way to deliver the discipline to the learners. Subject-specific knowledge is recontextualised when we transfer it to a specific context. Sometimes you need to use different terminology, depending on a context or the groups of learners [FE college tutor].

Recontextualisation in this context also deals with how the subject specifications and generic teaching standards are selected in terms of what to teach, the order in which things are taught, the time that is required to cover the curriculum, and how the different parts of the subject specifications are related to each other and to generic teaching standards. Also, the past knowledge and experience of trainees need to be considered in the teaching process (Loo, 2006).

4. Drawing on personal experience, embedding previously acquired personal skills and experiences in teaching practice: Crossing boundaries between personal experiences and teaching practice

Crossing boundaries between personal and work-related spaces involves transferring skills and knowledge acquired in one context and recontextualising them in a new context. As Pye (1994) suggests, recontextualisation draws on one's biography of experience, which is fluid, embracing past and future possibilities. Both our empirical and theoretical research emphasised the importance of tutors' individual biographies in the development of their teaching practices and methods. The significance of individual biographies, experiences and dispositions in the workplace and, in particular, in teaching practices, has been stressed by Hodkinson et al. (2004). They identify four overlapping and interlinked ways in which biography is relevant to learning at work:

▶ Workers/learners bring prior knowledge, understanding and skills with them, which can contribute to their future work and learning;

▶ The habitus of workers, including their dispositions towards work, career and learning, influence the ways in which they construct and take advantage of opportunities for learning at work;

▶ The values and dispositions of individual workers contribute to the co-production and re-production of the communities of practice and/or organisational cultures and/or activity systems where they work;

▶ Working and belonging to a workplace community contributes to the developing habitus and sense of identity of the workers themselves.

Loo's (2006, 2011, 2012) research also emphasises that one way in which teachers can acquire their knowledge is from their life experiences. Within the present research, interview data already indicate a wide range of learning experiences outside formal teacher training schemes or other formal education and training settings. While the considerable learning which takes place in the workplace has been increasingly recognised, learning also results from a range of life experiences, in home and family settings, engaging in volunteer activities, and overcoming various setbacks in life. Our interview data have shown that tutors' and practitioners' prior experiences play a significant part in developing their teaching practices:

> My previous work and life experiences have greatly influenced me in the way I deal with [challenges of the teaching profession]. I have had jobs in a variety of different employments in Australia, the US and UK in both large and small companies, plus I studied for several years to qualify in Homeopathy and Reflexology as well as gaining more conventional academic qualifications and it is clear to me that both management of staff or management of students has many parallels. The best managers and teachers I have had

have been the approachable easy-mannered ones, those confident enough in their own world to either delegate work without strings attached or calm and patient enough to talk things through [FE college tutor].

The acquisition of these skills is often tacit in nature and thus individuals do not necessarily recognise to what extent they use their previously acquired skills in their teaching practices or draw on their learning biographies in developing new strategies and approaches to be used in college contexts. However, our research has indicated that these skills have proven to be very important for the development of teaching practice in a college context. Various dimensions of the tutors' previous experiences as well as their previously acquired skills are re-contextualised in their current workplace context. In this context, recontextualisation of the tutors' previous experiences/skills and the crossing of boundaries between workplace and personal contexts could be either tacit or explicit. Loo (2006) points out that most life-changing experiences are informal, such as parenting, travel, balancing work and personal life, death in the family, living abroad, and the break-up of a serious relationship. He found that life-experience learning was significant in two ways. The first affected the individual, resulting in an expansion of skills, abilities or self-awareness, or the experience transforming the person. The second finding involved the value assigned to the experience by the individual, which might place a 'personal stamp' on the experience, such that it was viewed as of importance in the individual's life. Our interviews support the argument that tutors draw on their personal experiences and previously acquired skills when they undertake various teaching activities in college contexts. Their skills, knowledge and experiences are recontextualised in their new settings:

> I began teaching Art in 1993, then IT in 1994, at which time there were very few suitable materials available for the subjects that I was teaching. I taught mainly foreign students who were here to learn English and computer skills became part of their timetable. With no examples to refer to I devised training materials entirely based on my own personal work experiences. In hindsight these materials were at best adequate; however, they improved as my academic experience grew. I learned heavily from my mistakes [FE college tutor].

The tutor further demonstrates the way his skills and experiences are being recontextualised in order to respond to changing circumstances and become better embedded in everyday teaching practice:

> Today, however, I have changed the way I teach in response to the different students I now encounter. Previously they were foreign students who had high levels of capability and they also expected a more traditional lecture-centred delivery. Now I teach mostly local and younger students who initially at least seem to need more parenting and role modelling as well as academic training. There may be several factors at work here in that these students come with higher levels of IT skills having grown up with this technology

as a key part of their lives, yet their academic skills are generally very poor. The focus for these students appears to be more on their basic communication and social interaction skills so the traditional lecture-centred teaching system is not always the most appropriate method. The original simple system of materials delivery I used, based heavily on my previous work experience, has changed significantly, due principally to my academic experience [FE college tutor].

This indicates that the workplace environment fundamentally affects how skills and knowledge are put to work (Evans et al., 2007). The work of Hodkinson et al. (2004) illustrated the importance of the influence of prior activity on current activity and the different ways in which actors may construe situations as being 'similar'. In this context, multiple processes involved include adjustments to affordances and constraints, and the distribution of 'transfer' across mental, material, social and cultural planes. Furthermore, skills and knowledge have to be developed and possibly changed, as they are operationalised in the culture of the new workplace. Furthermore, it is not the skills and knowledge that develop, but the whole person, as s/he adjusts, with greater or lesser success, to working in a new environment. That adjustment depends as much on the receptive or expansive nature of the new workplace as on the prior experiences that workers bring. Put differently, the processes entailed can be significantly helped or hindered by the actions and dispositions of employers and co-workers.

Different factors derived from workplace environments influence the way skills are embedded in teaching practices. In addition, workplace environments enable individuals to learn and acquire new skills and experiences, which are then recontextualised within the same environment but maybe also within different contexts of the environment. The next section will consider some aspects of the embedding and recontextualising of skills acquired in workplace practices.

5. Crossing boundaries between work-related practices: Drawing on workplace experiences/embedding (newly) acquired skills and experiences in teaching practice.

5.1 The significance of workplace experiences

As our interviews suggest, tutors' work involves crossing boundaries between various concomitant (parallel) settings and contexts. Apart from the recontextualisation of personal skills and personal experiences in their teaching practices, college tutors tend to actively use skills, practices and professional knowledge and experiences that they have acquired in their workplace practices, often from informal learning. Unwin and Fuller's (2003) definition of the workplace embraces all types of learning generated from or stimulated by the needs of the workplace, including formal on-the-job training, informal learning and work-related off-the-job education and training. Evans et al. (2006) adopted this definition in their formulation of workplace learning as that learning which derives its purpose from the context of

employment, i.e. 'learning in, for and through the workplace'. Learning here is perceived as something that 'you do continually whilst at work, both out of choice and by necessity' (Gray et al., 2005). Similarly, 'most of what we learn takes place at work rather than on formal courses. Work activities, the workplace, the supervisor, other workers … are the key learning resources for workers' (Malone, 2005, p. 67)

What employees learn as learners-in-the-workplace leads to the development of certain skills or competences, which may be job-specific or related to occupational or personal development. Recontextualisation of such skills and competences is important in this context. Even if the work-related skills of teachers/tutors have been acquired within the setting of their current workplace, the skills often need to be embedded and recontextualised within the same workplace, but within different contexts of the same workplace. Examples could include, for example, acquiring skills through participation in a range of Continuing Professional Development (CPD) sessions, and then embedding and recontextualising these skills in real teaching practices.

Our respondents reported that in order to be deployed and utilised, such newly acquired job-related skills, knowledge and experiences need to be recontextualised, or in other words, properly embedded, in the work with learners, for example, in classroom activities. Transferring skills and knowledge from one location (context) to another is neither straightforward, nor simple. It depends on many factors, such as tutors' attitudes and dispositions, regulatory frameworks and the structural organisation of their workplace environment as well as workplace constraints or opportunities.

Our research has indicated that the process of recontextualisation can be facilitated by tutors' positive attitudes towards learning in the workplace. College environments could be thought of as workplace environments where tutors/practitioners could assume the role of learners within these environments, in the sense that they can learn through their workplace experience and activities and develop their skills and competences. Workplace recontextualisation takes place throughout workplace practices and activities that support knowledge development and through mentorships and coaching and other arrangements through which individuals can engage with and learn through workplace environments (Evans et al., 2004). Our fieldwork has suggested that tutors' skills and teaching practices are in the process of constant development within their college environments. Their skills and knowledge need to be continuously recontextualised in their workplace (college) environments, as the environments themselves are in a process of constant transformation. The factors that contribute to this transformation include new/changing learners' requirements, changing government policies, internal changes in the college, etc. All these changes require tutors to adapt their skills and knowledge to the changing demands of workplace environments. Thus, their knowledge needs to be recontextualised and embedded in their current practices.

Recontextualisation of knowledge and learning in the college environment could be facilitated through the following:

▶ Encouraging tutors to be lifelong learners;

▶ Genuinely putting the learner first (e.g. influence of external drivers);

▶ Supporting tutors to achieve accreditation aims from a learner's perspective;

▶ Facilitating tutors to use new technologies as part of the lifelong learning process.

Fuller and Unwin's (2004) typology of expansive and restrictive workplace environments suggests that workplace environments *experienced as* expansive facilitate further development, deployment and embedding of skills, whereas environments *experienced as* restrictive are found in workplace settings that do little to encourage further professional training or development of new skills. Restrictive working environments are also connected with isolation at work when employees have a feeling that they are outsiders or mere observers. Conversely, as the authors observe, expansive workplace settings are often associated with the feeling of being part of a team at a workplace. Our research findings support the argument that environments experienced as expansive facilitate the meaningful recontextualisation of tutors' skills and experiences.

5.2 Recontextualisation of knowledge at work through the use of modern technologies

The growing role of technologies in work-related learning has been emphasised by our interview data. The use of technologies is considered to be an important trend across all areas of work-related learning. The interviews with tutors indicated that the introduction of a range of technologies in a college environment has been regarded as a beneficial development that could improve learners' motivation and facilitate their skills and competence development. The use of technologies has been gradually changing approaches to and ways of teaching and learning in work-related contexts. In this context the concept of mobile learning has been emphasised by our research. Pachler (2009) stresses that mobile learning is not simply about delivering content to mobile devices but, instead, about the processes of coming to know and being able to operate successfully in and across new and ever-changing contexts and learning spaces. Our respondents reported that the use of modern technologies in their college environments may help the process of recontextualisation of knowledge and skills in their teaching practices. One of the respondents argued that various configurations of modern technologies in the college setting facilitate the transmission of knowledge from one context to another:

> The use of blackboards, VLE (Virtual Learning Environment), e-mails, and even a mobile phone helps me to recontextualise the knowledge and transmit it to the learning in my teaching practice. Learners feel more motivated and receptive, in terms of the knowledge acquisition [FE college tutor].

Modern (digital) technologies alone do not facilitate learning. To be meaningful, e-learning processes need to be grounded in a pedagogical or educational approach. E-learning or modern technologies provide opportunities to facilitate and support teaching practices in the college context, in particular, by providing flexibility of time and place of delivery; allowing the sharing and re-use of resources; enabling collaborative working and fostering student-centred learning.

Modern technologies facilitate the implementation of methods and approaches to be recontextualised in teaching practices. One specific approach that has been piloted in the college has aimed to enhance learners' motivation through self-evaluation of their personal competences and tacit skills. The approach has employed the Dynamic Concept Analysis (DCA) modelling method (as a tool for self-evaluation of personal competences in the context of classroom- or work-related activities). The DCA method, assisted by a dedicated software programme, enables users to build conceptual models that can be used for self-evaluation purposes.

Tutors maintain that the self-evaluation of learners' skills in the context of classroom activities may help learners and their tutors to establish links between skills development and certain classroom tasks and assignments. As a result, the process of skills development could be potentially facilitated by tutors through more purposeful learner-centred implementation of various activities and tasks within the classroom. Self-evaluation of the learners' personal skills and competences in the context of classroom activities has a positive impact on learners' confidence, self-assurance and learning outcomes. Learners' awareness that they are able to use their previously acquired skills in various classroom activities enhances their confidence and encourages them to use their skills more actively and intensively (Fuller & Unwin, 2004). Moreover, if learners recognise that they develop or deploy their tacit skills within various classroom activities, they feel motivated towards more active participation in such activities, which ultimately contributes to their positive attitudes towards learning. While both learners and the tutors recognise the potential benefits of modern technologies, they notice that all types of technologies need to be implemented carefully, taking into account learners' individual needs and backgrounds. Some students may need more training and support before they can feel confident to use technologies within their learning or workplace settings. Some students need more time to get used to them. Our data suggest that if learners' individual needs and requirements are not taken into account, technologies may provide barriers to learning and, as a result, undermine learners' motivation. Our interviews have shown that tutors may play an important role in the process of supporting the learners in using technologies for the benefit of their learning. As e-learning becomes embedded in adult learning, it may further contribute to facilitating expansive learning environments for adult learners in both workplace and college contexts. Technologies enable learners to shape and personalise their learning environments in order to respond to their individual requirements and provide meaningful learning. In addition, these factors may influence both learners' motivation

for knowledge acquisition and learners' motivation to use technologies within their learning contexts.

5.3 Recontextualising to motivate

The data indicate that when tutors are able to recontextualise their own skills and knowledge in their workplace environments, they might also motivate their learners to use and employ their previously acquired skills in the classroom. Our interview data suggest that tutors may employ a number of methods and approaches to help learners to make their skills visible and to improve their motivation. Teamwork, one-to-one tutorial help and encouraging learners to help their fellow-learners have been identified as the methods that may help to uncover tacit skills and to enhance their motivation. Another important factor has been associated with the prior/current workplace experiences of adult learners. One student who combines her studies with part-time work commented on how her workplace experiences contribute to her understanding of her learning experiences in the college. At the same time, her experiences within the college setting motivate her towards evaluating and reconsidering her workplace practices:

> What motivates me personally is I do enjoy learning, the process. And I do think it will be useful because […] when you are in the working environment, you are very much coping with the day-to-day demand and you don't have time to step back and think about it. So, seeing this, coming on this course, rather, gives you that insight, almost stepping back and looking at things you do at work more objectively [FE college student].

The interviews have shown that tutors and supervisors may considerably facilitate learners' motivation by drawing on their work settings and experiences in the course of their learning activities and assignments. As noted by another student:

> What I like about the course, it's very work-related, because we are asked to think about our own situation and how we work ourselves. I find that really helpful because it makes it easier to understand the work that you are doing if you can apply it to your own workplace [FE college student].

Recontextualisation of learners' experiences and competences reflects positively on their skills development and recognition. Motivating learners is considered to be an important aim of the learning process in the context of adult/further education. By emphasising the significance of the learners' attitudes and disposition, tutors may stimulate them towards better performance and achievements within their learning:

> With this in mind the primary methodology I use is therefore more psychological than academic in that I always treat all students as adults, continually stressing that their performance is wholly derived from their own attitude to their work. Statements like 'only

you are in control of your life' and 'I am just one of your resources' underpin the way I now work with students. Preparing them to be independent learners is, I believe, essential, yet this only appears to work efficiently when there is a mutual trust or bond formed [FE college tutor].

Tutors may draw on their own experiences in order to facilitate students' engagement and motivation. Taking into account and recognising learners' personal interests and dispositions may significantly enhance their learning attitudes:

This takes time to achieve but once a student's confidence is gained then the task becomes much easier. Another key aspect that I use based on my academic experience is to engage students in their world not my own. To achieve this I don't discipline them for their 'novel' internet use (games or football sites mostly). I ask them to show and explain the sites to me. I do, however, mention that they may need to hand in some work at some time. I find this deliberate lack of judgement or punishment from me in time creates that important mutual trust that I have mentioned even with the more aggressive 'alpha males'. The other key element is establishing realistic, agreed boundaries with students [FE college tutor].

The project findings suggest that providing adult learners with the opportunities 'to be motivated' or facilitating their intrinsic motivation may enhance their learning success and skills development. Tutors may employ various methods and approaches to facilitate learners' motivation including employing self-evaluation tools, facilitating teamwork and group discussion, and providing feedback and support for learners. Tutors may also motivate learners by providing them with the opportunities to relate their acquired skills to their workplace situations and environments.

6. Conclusions

Crossing boundaries between a range of settings and contexts, both past and concomitant, plays an important part in the development of teaching practices. Crossing boundaries involves transferring skills and knowledge acquired in one context to a variety of new contexts. Employing skills and knowledge in new contexts through recontextualisation has become a significant element of everyday teaching practices in VET settings. The research has indicated that tutors continuously draw on their previous and current experiences and knowledge, sometimes subconsciously, in order to develop their pedagogical strategies and approaches within their institutional contexts. The significance of different types of knowledge and experiences has been emphasised by our research interviews, including knowledge gained from life experiences and from workplace learning, as well as from a range of various informal contexts and settings. Recontextualisation of such knowledge and experiences occurs when tutors draw on a specific skill, knowledge or experience in their pedagogical practice. It could

be facilitated by, for example, the necessity to introduce new teaching strategies; to respond to specific learners' requirements; to change the learning environment in the classroom; or to motivate the learners. Recontextualisation in this context presupposes embedding previously acquired skills in new settings or contexts, and this process often involves self-evaluation of tutors' skills and approaches in responding to constantly changing learners' needs:

> As for recontextualisation of knowledge, this is an evolving process that doesn't just happen between different sites and institutions but also between different groups and individuals. However, based on my own experience I would also suggest that the most important element to consider is the continuing evolution of a lecturer's own experience in the academic sphere. It seems that today's students are changing due to the technological influences they have grown up with, including significant changes in our social strata. Could it also be that work-related experience may be a key asset while flexibility and innovation based on current needs and experience can also be highly beneficial? I would reason that one method of teaching or even the use of various dynamic techniques to entertain and engage students may not be enough. I suggest that innovative lecturing techniques influenced by a lecturer's work and life experiences yet based on current student needs, which include a patient sensitivity to each individual, may be more beneficial to students trying to academically achieve despite their previously stifled potential in the educational sphere [FE college tutor].

Through engaging in various configurations of their teaching practices, tutors and practitioners cross boundaries between a range of spaces and contexts and recontextualise their skills and knowledge in new settings. What is more, as a result of boundary crossing and of the recontextualisation of their previous experiences and knowledge, new knowledge or new types of skills may be constructed and developed. Another important factor is that of the influence of the workplace environment. Tutors entering a new workplace may experience their working environment as expanding, and this would also facilitate further embedding and recontextualisation of their skills. Environments that are experienced as giving recognition to and supporting deployment of their tacit, as well as explicit, skills assist in further development. The parts played by tutors in creating environments that support their deployment of skills and their further learning are contributory factors. The way they experience these environments often has to do with the feeling of being a part of a team, allowing them to deploy their tacit skills in ways that enhance their confidence and self-assurance. Beyond the transfer or recontextualisation of skills and knowledge we emphasise the agency of the whole person (such as tutors' identities) and their personal processes within social settings, which structure their experiences and facilitate the way they engage in crossing boundaries through constructing and negotiating the opportunities and constraints of new environments.

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Loek Nieuwenhuis, Aimee Hoeve, Wietske Kuijer, and Annemieke Peeters

▶ Bridging Demands on Education, Innovation and Practice-based Research. The Case of Dutch Vocational and Professional Education

1. Introduction

Vocational and professional educational institutes are educating students for a large variety of professions. The future of most professions is uncertain: technological and socio-economic developments will have a high impact on professional work in the near future (cf. Susskind & Susskind, 2015). In order to deliver responsive higher education, vocational and professional colleges are continuously improving their relations with professional practice: a triple helix model, consisting of education, innovation of practice and practice-based research is scaffolding both students' education and the innovation of professional practice. Examples are teacher training schools as extensions of the teacher training college; innovation hubs in technical industry as extensions of technical colleges and civil society labs as extension of the social college. In these learn-work environments practitioners are working on innovation of their own professional practice, whereas students are performing their internships and are researching themes of interest for professional practice.

The authors of this paper work at HAN, the university of applied sciences (UAS) in Arnhem and Nijmegen, two neighbour cities in the eastern part of the Netherlands. At HAN UAS several academic learn-work environments, called sparkcentres or innovation hubs, are designed as trials for triple helix locations in the last five years. Thermion (a locally embedded cluster of practices for first-line care) is such an academic learn-work environment. Students from courses for the physiotherapist, nurse, dietician and other paramedical professions follow their internship in these facilities and do practice-based research for their final exams. Professionals and citizens around Thermion are looking for improvement of professional practices: faster recovery of patients is their social and managerial drive. Educational researchers from HAN (i.c. the authors) have done an ex-ante evaluation of these learn-work environments. Based on design logics, literature around work-based learning (Tynjälä, 2008; Nijhof & Nieuwenhuis, 2008; Zitter & Hoeve, 2012) and on practice-based research, design principles are formulated to evaluate the learn-work environments both on the learning potential of the workplace as well as around the organisation of responsive colleges.

In the paper we will present the rationale behind the design principles and we will present the results of the first application of these principles for the evaluation Thermion and other academic learn-work environments. Conclusions will be formulated on the (further) development of triple helix academic learn-work environments and on the usefulness of the principles as an evaluation format.

2. Innovative work-based learning as a catalyst for university-business collaboration

The collaboration between universities and business[1] (UBC) is growing in prominence. Universities need to participate in regional development (Lee, 1996; Motohashi, 2013), whereas business needs access to recent academic and professional knowledge. UBC supports regional economic prosperity through the establishment of strong knowledge networks and innovative local communities. Europe is embracing the need to create an active relationship between government, business and higher education institutes (HEI) in order to increase employment, productivity and social cohesion (Davey et al., 2011). Work-based learning (WBL) is seen a powerful tool to enhance UBC (see Narayanan, Olk & Fukami, 2010); by involving students as partners in work integrated, authentic innovation projects, a double-edged knife will be developed. Both universities and small and large businesses have benefits in the field of knowledge-creation processes (influx of new ideas and research ideas, strong linkages and accessible networks) and new generations of professionals are being educated and trained for innovative work processes, which are needed for an unpredictably changing labour market.

Institutes for higher education (HEI) are reconsidering their role all over Europe. Creating value in three domains (preparing students for entrance to the labour market; lifelong learning to support professionals and businesses; and regional innovation in co-makership with business) requires adaptive organisations in which new services and network activities are embedded in flexible faculty. Capacity building for the learning economy is a core activity for university and faculty managers of HEIs and VET colleges.

However, in the scientific literature, professional education and regional innovation are disconnected. In the literature on regional development (cf. Cooke et al., 2011), vocational and professional education are seen as a regional asset, whereas in the literature on vocational and professional education, economic innovation is seen as contextual. Work-based learning (in US literature they often use the term work-integrated learning, WIL, so stressing a curriculum perspective) has high potential as a linking mechanism (Narayanan, Olk & Fukami, 2010; Rampersad, 2015; Nelen et al., 2010). Nelen et al. (2010) show that combinations of work and learning have an impact on both labour market entry for graduates and on the absorptive capacity of enterprises: WBL has an impact on enterprise productivity and

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1   We use the term 'business' as a broad term for both private enterprises and public professional organisations.

innovativeness. Rampersad (2015) argues that WIL offers the missing link between teaching and knowledge utilisation through commercialisation. Narayanan et al. (2010) show proximal and distal benefits from internships both for universities and businesses, besides students' benefits. Both for universities and for business, a reciprocal flow of new ideas and knowledge is the result of stronger UB-linkages through WBL.

WBL is a powerful instrument at the intersection of three value domains, because it supports the entrance of students to the labour market, it is the carrier for lifelong learning activities and it connects knowledge development in enterprises to knowledge development and research at the universities. Students' involvement in WBL-projects has a triple impact, in particular when such projects are focused on innovation of professional practice (iWBL). Innovation implies conditions of uncertainty and processes of new knowledge creation, both of which support students' development of adaptive, metacognitive skills (cf. Lehtinen, Hakkarainen & Palonen, 2014). So, the aim is to develop innovative work-based learning projects at the edges of university programmes and business development. We coin this approach by the term 'innovative work-based learning' (iWBL). University students, university faculty and business employees will be challenged to investigate and innovate cooperatively, in iWBL projects targeted at challenging social and economic issues.

3. Organising regional collaboration

Vocational education and training (VET) and higher professional education (HPE) have to be considered starting points for professional lifelong learning. As Nieuwenhuis (2013) states, initial education for the labour market can be seen as a 'drivers' licence': we just dare to let students drive, but their driving skills and routines have to be developed during traffic practice. The same counts for vocational and professional preparation. For proficient skill levels, an estimated 10,000 hours of deliberate practice is needed (cf. Ericsson et al., 2006) to develop sufficient expertise: this exceeds the three to four years of education in VET or HPE. Technological and societal developments urge for continuous learning during the lifetime: lifelong learning is needed to keep up with innovation and change.

Figure 1: Lifelong professional development (from Nieuwenhuis, 2013)
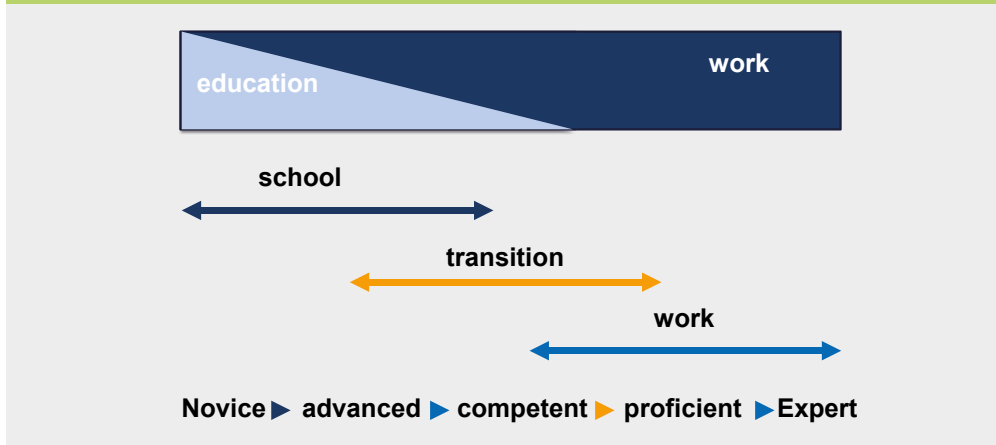
VET colleges and HEIs are challenged to collaborate with companies and employers to develop 'induction' programmes for the transition stage and flexible programmes for adult education. In the Dutch system, this is really a challenge: the faculty of colleges and HEIs is neither used to nor equipped for flexible delivery of high level courses. The urgency to deliver flexible pathways and to organise responsive VET and HPE is challenging their bureaucratic routines (cf. Rinnooy Kan, 2014). Standard routines have to be re-examined, with implications for faculty development (cf. Steinert, 2014). Coming from a 'schoolish' Bachelor+ routine they have to develop towards flexible organisations which can deliver tailor-made services.

Rosenfeld (1998) raised this general question already at the end of the last century: how can technical colleges develop towards responsive regional knowledge centres? For his global 'tour d'horizon' Rosenfeld uses the term technical colleges for vocational and professional schools for about ISCED levels 4-6; the upper layers of Dutch VET and the professional HEIs can be encompassed by this term. To become a regional knowledge centre, technical colleges should fulfil four important roles according to Rosenfeld:

▶ The education and training of new employees and employers to scaffold the knowledge base in companies,

▶ the supply of up-to-date information and training facilities to update the knowledge and skills of the workforce,

▶ the facilitation of adaptation to new technologies,

▶ the organisation of active networks of companies to facilitate interactive learning and innovation processes.

Nieuwenhuis (2002) reports on European research on organisational change in VET colleges towards a position as regional knowledge centres. Although these colleges are aware of the urgency to develop new ways of training and knowledge delivery, they do not yet have the right instruments for realising this. Colleges are locked in traditional routines of educational supply, in which certainty plays a major role; certainty about course content, course delivery and assessment procedures. Developing colleges towards regional knowledge centres causes uncertainty and implies reconsidering traditional routines. Hommen (2002) is sceptical on the adaptive capacity of colleges: "such organisations normally operate within highly institutionalised environments where they are rewarded for establishing correct procedures and processes, not for quantity or quality of their outputs, …., consequently they respond to important institutional changes by 'ceremonial enactments of conformity'". Both managerial actions and bottom-up faculty development are needed for the enhancement of regional knowledge centres.

Pavlin (2016) identifies similarities between universities' and businesses' behaviour, especially concerning the drivers for UBC (mutual trust, commitment and shared motives) and UBC outcomes (the development of competencies). Pavlin also found large behavioural differences between employers and university in structures and approaches and perceived UBC barriers (bureaucracy in the HEIs; differences in time horizons). In most UBC approaches the main avenue for UBC development is along the lines of knowledge creation in innovation and research and development (R&D). Work-based learning is a complementary, promising approach to UBC development, focusing on competence development of students (Narayanan, 2010; Rampersad, 2015), through involvement of students in authentic innovative projects.

4. Design principles for innovative work-based learning

4.1. Learning for constructive transfer

Sfard (1998) coins two intertwined metaphors of learning: acquisition and participation. Learning can be seen as the acquisition of skills and knowledge, but should also be seen as a social process of belonging to a community. Paavola, Lipponen, and Hakkarainen (2004) challenge these two metaphors of learning, stating that both metaphors describe reproductive ways of learning. They propose a third, knowledge-creating metaphor of learning, in which learning is seen as deliberately producing new, innovative knowledge and social practices. Lehtinen, Hakkarainen, and Palonen (2014) use this insight to build a learning theory for the professions in times of rapid change. Central in their argument is a new perspective on transfer of knowledge. Traditional VET and HPE are mainly relying on an application model of transfer: knowledge and skills learnt in education are meant to be widely applicable in a diversity of professional situations. This application model stands on the assumption that tasks are rather stable and that transfer "reproduces existing relations between fixed tasks". In times of rapid change, fixed tasks are becoming rare, and the professional should

be prepared for future learning activities. Lehtinen et al. (2014) suggest replacing the application model of transfer with a construction model, in which the professional constructs and produces relations of similarity: the professional interpretation of new situations and phenomena as the starting point for deliberate practice of new skills and applicable knowledge. A knowledge-creating metaphor of learning inspires new models for professional education to deal with rapid changing situations. Jonassen, Strobel, and Lee (2006) argue in the same vein that the traditional view on transfer does not prepare technical students for everyday problem solving; they stress the need for preparation for future learning in working situations: "In modern engineering contexts the need for continuous lifelong learning has never been greater". Professional education programmes should support learning to solve complex and ill-structured workplace problems in order to prepare students for future learning and work.

4.2. Cases from social and health professions

Based on such insights, the HAN-UAS strives for responsive higher vocational education in all its professional fields (HAN policy plan 2016–2020). In particular, the Faculty of Health and Social Studies started pilots on innovative work-based learning driven by changes in healthcare and healthcare systems. So called 'sparkcentres' are developed as innovative hubs at the edges of education and work. The sparkcentres offer iWBL arrangements in which students, faculty staff and professionals encounter workplace problems that are complex, and need different perspectives to find workable solutions. Both students and professionals are challenged to solve problems through inter-professional collaboration, i.e. collaboration of different professional disciplines.

The sparkcentre 'Thermion' started in 2013 as a forerunner to put ideas about UBC into practice. This sparkcentre is located in the Academic Primary Healthcare Centre Thermion. A renovated factory building in a newly developed neighbourhood accommodates fourteen different professional practices: general practitioners, pharmacy, occupational therapy, physiotherapy, district nursing, midwifery, psychological counselling and social work. Although assembled under one roof, these practices remain separate economic units. All these professionals have to cope with continuing political, financial, social and cultural developments that induce the changes described above, calling for innovation and new models of primary healthcare. The professionals in Thermion have voiced the urgency to further develop innovative community-based and person-centred care in their daily practice.

In the first phase a dialogue was organised between educational staff of both HAN (responsible for educational programmes in paramedic studies, nursing and social studies) and Rabout University (responsible for education of general practitioners) and health and social care professionals of Thermion. This dialogue aimed at creating a shared vision on future healthcare and professional development. In the second phase, a physical space was designated at the premises of Thermion as an innovation lab: the home of a future community of

learning and innovation in person-centred care, consisting of students, teachers, researchers, professionals and clients.

Educational researchers from HAN-UAS (i.c. three of the authors of this chapter) were involved to execute design research (cf. Van Aaken and Andriessen, 2011) to support the design and implementation of the sparkcentre educational model. We expect this approach to provide a solid foundation for embedded iWBL. The design-based research approach will allow us to create a framework for the development of iWBL and its integration into higher education, which will be broadly applicable both within HAN and beyond.

The first iterations of this research (Hoeve and Nieuwenhuis, 2015; Kuijer, Hoeve, and Hendriks, 2017) generate insights, which mainly focus on the design and implementation of iWBL. In these iterations data are gathered through analysis of documents and materials, focus group interviews with students and professionals and evaluation sessions with all stakeholders involved.

The initial design of the sparkcentre is that each semester two groups of students invade the Thermion health centre: the first group consists of 10–15 students from HAN-UAS who follow their disciplinary internships in one of the practices and collaborate in an inter-professional education programme. Additionally, a second group of 15–20 students work on (inter)disciplinary innovation and practice-based research projects. The idea was that students could fulfil the role of change agent towards community-based and person-centred care. Teachers and researchers from HAN scaffold these students' professional development, activities and projects on site and in collaboration with the practitioners.

During three academic years (2013/14; 2015/15; 2015/16) about 50 students from seven different bachelor programmes have fulfilled their internships at Thermion. Following this, 106 students have been involved in the research projects. These students report that their engagement in inter-professional activities at Thermion was interesting and challenging, but frustrating at the same time. The students have experienced Thermion as a powerful learning environment. Yet, they struggled with their role as change agents: they kept wondering how they were supposed to induce change as a novice in their field, and similarly innovate and cross borders between different professional fields. Some students expressed the feeling that being new (to the organisation) and inexperienced is not a good starting point to start talking about change to the professionals. However, at the same time the students recognised they can facilitate change by bringing in new elements from school, research or other practices. Further, they came up with ideas to deliberately design activities to bring professionals in contact with these elements. So where the term change agent placed the students under a heavy burden, the term boundary crosser or broker (cf. Akkerman & Bakker, 2011) was felt as more inspiring, as doing more justice to the position the students are in.

Boundary crossing takes place in a purposively assembled 'community of practice' (CoP) in Thermion, in which students, teachers, researchers and citizens learn and work together to contribute to a 'lively Lent'. The activities within 'lively Lent' should contribute to the self-management of elderly people and contribute to staying living independently at home

in Nijmegen Lent, the area where Thermion is located. This practice example of Thermion reveals that to learn and innovate in a sparkcentre requires new roles for students, professionals, teachers and citizens. They are challenged to engage in boundary activities, in which the learner is not necessarily the student, the designer of learning activities is not necessarily the teacher, and the expert is not necessarily the professional. It takes time to develop these roles, adapt to these roles and get familiar with role switches.

Another lesson from this case is that practice-based research projects were interesting but did not automatically result in a collective body of knowledge. Students reported that they hardly contributed to further development of person-centred care at Thermion; sometimes they felt the results of their research were destined for oblivion. Besides, they ran into the borders of their own professional educational criteria, which obstructed collaboration in practice. Two important lessons were drawn from student feedback. First, it requires cooperative effort from faculty staff and professionals to formulate a common research agenda as a driver for collective knowledge building. Second, students need to be better prepared for inter-professional research. This created the urgency for implementation of inter-professional education in the HAN curricula, in order to permeate existing boundaries between the different educational programmes.

This brings us to the basic principle underlying the sparkcentre approach: it takes collective effort or co-makership from faculty staff and professionals. Experiences from the Thermion case show that co-makership is not easy. It requires mutual trust, a common language and the willingness to attune to the pace of the work process and environment. It requires the development of new ways of working that need to be embedded in existing work practices and curricula.

The case of Thermion is forerunner for the development of health professions' education in the HAN-department for Health and Social Studies. As result of the perceived success these pilots have been recently scaled up: iWBL arrangements are to become a regular feature of all faculty programmes. In these environments, 25–30 students from different healthcare disciplines, two embedded teacher/researchers and practitioners work together with citizens on authentic issues in healthcare. These inter-professional iWBL arrangements are developed and enacted in collaboration with local organisations for health care and social work. By integrating a research perspective in these environments (practice-based research involving faculty and students), we strive for common goals for students, professionals and staff: becoming a reflective practitioner and develop critically reflective work behaviour to support evidence-based practice and contributing to innovation. Involvement of researchers in the professional field enhances research capacity building and faculty development in Health Professions Education.

Figure 2: Innovative WBL as catalyst for university-business collaboration
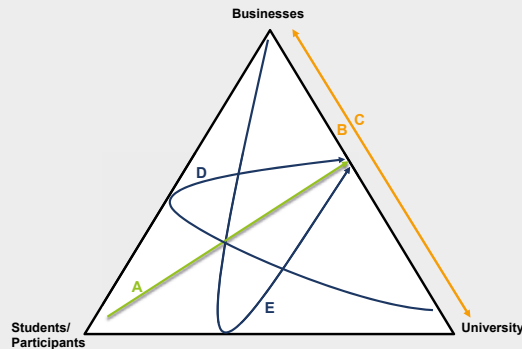
As of 2017, sparkcentres were blooming and flourishing, not only in the social department of HAN but also in the technical department, where they are called 'innovation hubs'. The processes described by Narayanan et al. (2010) can be seen as arrows in the UBC triangle (see figure 2): students' activity (A), business activity (B) and faculty activity (C) add to the regional impact of authentic, innovative work-based learning. Arrows E and D stress the importance of practitioners' and faculty's impact on the interaction between the other two partners, both aiming at enhancing long-term university-business collaboration.

4.3 Developing design principles

We (the authors of this chapter) have executed design-based research to support the design and implementation of the sparkcentre educational model (cf. Hoeve & Nieuwenhuis, 2015; Kuijer, Hoeve & Hendriks, 2017). As of 2017, this is work in progress. In 2017-2018 evaluations will be done of students' learning processes and results. In 2015 an investigation was done on the implementation requirements of iWBL educational models. Based on a literature search and observations and interviews with representatives of the three actor groups (practitioners, students and faculty members), a set of design principles has been formulated, which can (and will) be used for further implementation and evaluation of the sparkcentres and innovation hubs.

In an iWBL setting the focus is no longer on the interaction between student and teacher, but on the broader work context. Students' learning and working are closely linked. Self-regulation of learning processes and career development are important. IWBL supports the students to encounter real-life professional problems, so complex formal and informal learning processes can take place in interdisciplinary settings. Autonomy, collaboration and inter-professionality are all at stake. For practitioners and faculty, iWBL offers ample possibilities for networking and co-makership.

Hoeve and Nieuwenhuis (2015) performed a literature study to lay an evidence-based fundament for the sparkcentre model. Starting from the metaphor notion of Sfard (1998; see 4.1.), situated learning for professional development is worked out (cf. Engeström, 2009; Van Merriënboer en Kirschner, 2013; Lave & Wenger, 1991). Authentic tasks in hybrid learning environments are used as examples and good practices (cf. Zitter & Hoeve, 2012). Theories on workplace learning (Billett, 2001; Tynjälä, 2013; Nijhof & Nieuwenhuis, 2008), on workplace guidance (De Bruijn & Leeman, 2012; Swager et al., 2014) and on team learning (Wenger, 1998; Truijen, 2012) are also used as cornerstones for the model's fundament.

Based on this literature, a set of design principles is formulated, which is used as a guideline for model development and as a set of criteria for evaluative goals. During the design-based research activities, the set of principles is polished and slightly reformulated.

▶ A shared vision on future development of the sector is needed between faculty and practice. All actors in the iWBL project should agree on the fact that developments in the domain will affect working in the domain, which in turn will affect educational requirements for the domain. Building collaboratively on scenarios for future developments will support students, practitioners and faculty.

▶ Map existing affordances for learning and provide individual guidance and support. Onstenk (2003) has developed a model for the learning potential of the workplace, consisting of the following elements: job autonomy; variation in tasks; complexity of the work; social context (participation, room for decisions, and modes of interaction, guidance and feedback). Billett (2001) argues that a workplace with high learning potential does not automatically lead to high-level learning: students should develop agency to use the workplace affordances and should be supported to do so.

▶ Develop transformative leadership; transformative leadership targets on the professional development of employees and students, thus sustaining collective stakes and supporting collaborative goals. Truijen (2012) shows impact of transformative leadership on collective learning in TVET teams. Transformative leadership is a promising avenue for both practitioners' and faculty management.

▶ Develop and improve professional guidance; Swager et al. (2014) makes clear that guidance at the workplace needs a lot of improvement. De Bruijn and Leeman (2012) call for coaching, modelling and scaffolding as guidance strategies to be combined. In professional learning communities working on iWBL, students, practitioners and teachers are all (co)learning. This requires specific competences both for faculty and for practitioners.

▶ Connect dimensions of learning: be aware of the interplay between several modes of learning: formal-informal; acquisition-participation-creation. This also leads to thinking of sequences of practical learning: iWBL can be preceded by a 'pre-service' period, in which students are trained for specific skills, or by forms of simulation, in which students are allowed to make mistakes without endangering patient safety. In most professional

courses such pre-service and simulated periods are built in, but are not always very sophisticated.

4.4. Faculty development for iWBL

Working with iWBL for regional responsiveness requires new ways of operating of the UAS faculty. Faculty development (capacity building in terms of Fullan, 2007; cf. Steinert, 2014) "… involves everything you do that affects new knowledge, skills and competencies, enhanced resources and stronger commitments". It is a complex mix of motivation, knowledge and skills, scaffolded by organisational measures. Capacity building is trifold: it concerns personal capacity, interpersonal capacity and organisational capacity. The transformation from technical college towards a regional UAS can be characterised as a process of innovation, targeted at a complete new way of working. In the organisational literature the concept of routines is used to disentangle process innovation. Routines are collective, recurrent action patterns (Hoeve & Nieuwenhuis, 2006). They describe who is doing what and when and thereby define actions and roles. Routines are knowledge carriers: enterprise knowledge is consolidated in (organisational) routines. Routines are flexible: they enhance professional actions within communities of practice (CoPs; cf. Wenger, 1998), in interaction with changing economic contexts. There is always a tension between the need for efficient, routine-based action and the development of innovative ways of working.

An iWBL project can be conceived as a targeted action to 'catch' regional innovation within a defined setting. Innovation of professional actions always combines spatial and domain-specific aspects: professionals seek workable solutions within specific local communities and networks. UASs can support this by faculty's applied research and by students' innovative WBL. An iWBL initiative can be seen as a border post between the domain of working and the domain of learning, focussing towards process innovation on both sides. This is tough, because professionals and faculty are inclined to stick to their own routines. Boundary crossers (both from faculty and practice) need support to do this job; it is too great a challenge to assign the role of change agent to the students alone.

The development of iWBL as catalyst for regional development not only asks for a clear vision on students' learning and development, but also for a strong change programme for (inter)organisational routines and a regional innovative movement. This analysis leads to some additional recommendations and design principles for the development of iWBL initiatives:

▶ Collaborate on course development: educational teams in VET and HPE should be set up as 'extended teams', in which practitioners and teachers work together on curricula for initial and lifelong learning.

▶ Develop a human resource development (HRD) perspective on education: VET and HPE should enhance lifelong learning and development over the life course of professionals.

This counts not only for students and professionals, but UAS faculty members also have to be involved in lifelong learning endeavours.

▶ Capacity building and routine change: faculty management should be eager on process innovation and the consequences for capacity building. Routine change asks for concerted action; external pressure can support the process.

▶ Facilitate boundary crossers: often boundary crossers are distrusted and they enter contexts in which they are not specialised. Cherish your boundary crossers and support them in their challenging task.

5. Future perspectives

Universities, technical colleges and business all have to develop new 'organisational routines' to be able to cooperate effectively (see Davey et al., 2011). Processes, instruments and capacity requirements have to be considered, in order to develop a common set of design rules which are valuable tools for new university-business combinations. The target set of design rules supports VET colleges, HEIs and business to develop innovative WBL projects, which on the one hand offer adventurous possibilities for students to acquire future-proof flexible professional competences and lifelong learning skills and on the other hand elicit new linkages and exchange of new knowledge between university faculty and business. In the long term this will feed both the innovativeness of enterprises and the responsiveness of university courses and programmes for applied research.

Collaboration between VET colleges and HEIs, on the one hand, and professional practice, on the other hand, requires trust, common language and the 'same pace'. Innovative WBL asks for new roles for students, teachers and professionals which have to be embedded in organisational routines at strategic and operational level. The challenge is to develop from single innovative projects towards a regional innovation agenda, scaffolded both by educational institutes and by enterprises and public organisations.

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Carolin Böse, Agnes Dietzen, and Christiane Eberhardt

▶ Challenges of Formalising the Informal in German VET – Validation, Certification and Recognition of Competences

1. Work-based learning in the German context of application: Learning within the work process leads to occupational proficiency

In German, a multitude of definitions and underlying meanings – learning based in the world of work, workplace learning, work-related learning, work-process-oriented learning – are currently in use for the activities collectively denoted by "work-based learning" in English. The broad understanding of "work-based learning", which is geared towards "acquisition of knowledge and skills through carrying out – and reflecting on – tasks in a vocational context, either at the workplace (such as alternance training) or in a VET institution" (Cedefop, 2011) takes on more concrete shape in the principle of a specific "occupation", and associated "occupational proficiency", as the goal of initial vocational education and training. In this regard, "skilled occupation" stands for "a universal principle for the regulation of training contents and qualification standards" (Reuling, 2000, p. 21). The "concept of the skilled occupation" articulated here is anchored in the Vocational Training Act (*Berufsbildungsgesetz*, BBIG)[1] and in the Crafts Code (*Handwerksordnung*, HwO) and expressed in terms of recognised training occupations. "Skilled occupations" (*Berufe*) are both educational and employment-related constructs (Benner, 1995 in Reuling, 2000), which structure and regulate the labour market.

At present, initial vocational training within the German dual system is provided in the frame of apprenticeships in 327 recognised training occupations; for the majority of these, the standard duration of training is three years. The duration of training is designed to achieve the broad objective of vocational education and training defined in Section 1 of the Vocational Training Act:

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[1] Vocational Training Act (*Berufsbildungsgesetz* – BBiG) of 23 March 2005. (Federal Law Gazette [BGBl.] Part I p.931, last amended by Art. 9b of the Act of 07.09.2007 (Federal Law Gazette Part I p. 2246)

> Initial vocational training shall, through a systematic training programme, impart the vocational skills, knowledge and qualifications (vocational competence) necessary to engage in a form of skilled occupational activity in a changing working world. [It] shall also enable trainees to acquire the necessary occupational experience. (BBiG, 2005, § 1).

Against this background, dual-system initial vocational education and training aims to ensure that the teaching and learning process is geared towards the attainment of all-round holistic occupational proficiency and enables the apprentices/learners to obtain a qualification in a recognised training occupation.

The leitmotiv of vocational education and training, i.e. the acquisition of occupational proficiency, thus represents a concept that goes beyond the transfer of skills, knowledge and qualifications. Work-based learning is the central concept within the dual system of initial vocational training in Germany. In this context, the learning venue of the company takes on a central function in bringing about occupational proficiency. Apprentices spend three out of five days of the week in the company and two days at a part-time vocational school. Learning within the real work process and in authentic work situations is combined with formal learning at school.

The organisational interplay of the two learning venues is aimed at the development of technical, social and personal competences and is guaranteed by the fundamental regulatory instruments, which are the training regulations, the framework curriculum and the training profile. The draft of the training regulation (for the company-based component of the initial vocational training programme) is always developed under the coordination of the Federal Institute for Vocational Education and Training in cooperation with the experts nominated by the top-level employers' and employees' organisations. The draft of the framework curriculum (for the school-based component of the initial vocational training programme) is developed by the experts from Germany's federal states (*Länder*), which are nominated by each state's Ministry of Culture. The content and timings of these two drafts are coordinated partly by reciprocal attendance of each other's expert meetings.

Whether it is necessary to create an entirely new occupation or modernise a pre-existing occupation, and hence draft a new initial vocational training standard, depends on the evidence found regarding industry's training needs (Sections 4 and 5 of the Vocational Training Act and the Crafts Code). At an application meeting hosted by the federal ministry responsible, normally the Federal Ministry of Economics and Technology (*Bundesministerium für Wirtschaft und Technologie*, BMWI), in concord with the Federal Ministry of Education and Research (*Bundesministerium für Bildung und Forschung*, BMBF) and in consensus with the top-level organisations of the employers and employees, the respective education-policy benchmarks are specified. These form the basis for the development of draft training regulations and the coordination of these with the framework curriculum of the Secretariat of the Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* (*Ständige Konferenz der Kultusminister der Länder*, KMK) (https://www.bibb.de/en/42.php). Recognised training occupations are thus the result of (tripartite) negotiation processes between

the state and the social partners. They are an expression of the plurality of coordination (steering) built into the German vocational education and training system; that is to say, collective responsibility for the vocational education and training system (ownership) materialises in these standards.

This has far-reaching consequences: for the individual, the goal of this systematic learning process in initial vocational training is employment in a skilled occupation, integration into the labour market and legally binding assignment to a group in the collective bargaining system. A recognised initial vocational qualification facilitates access to occupational career and development pathways. In the German national qualifications framework (*Deutscher Qualifikationsrahme*n, DQR) initial vocational training is placed at Level 3 (two-year occupations) and Level 4 (three-year occupations). Selected advanced vocational training programmes are found on Levels 5 and 6; master craftsmen's certificates are likewise assigned to Level 6, and hence on an equal footing with a Bachelor's degree.

In the tertiary vocational education segment, work-based learning again has a system-constituting function, since an advanced vocational training programme normally follows on from the completion of initial vocational training in a recognised occupation, with several years of relevant occupational practice stipulated as a prerequisite in most cases. According to the Vocational Training Act, the aim is to extend occupational proficiency and provide preparation for occupational advancement (upgrading training). Advanced vocational training regulations, unlike those for initial vocational education and training, only regulate admission to an examination and do not stipulate that an initial vocational training course or education programme must be attended. As a rule, however, candidates attend advanced vocational training courses, e.g. at master craftsman and technician training academies, in order to be able to pass these examinations. The acquisition of an advanced vocational qualification is thus generally based on a combination of formal learning and prior occupational experience. The vocational proficiency (*Beruflichkeit*) as a leitmotiv of upgrading training is rooted in competence development in the work process, which can equally be accomplished without formal education and training, in principle. In this connection, however, it must be emphasised that a pass grade in an examination provides documentation of the qualification standard set out in the advanced vocational training regulation only; other individual learning outcomes acquired in practice and exceeding or complementing the standard are disregarded within this reference system.

Initial and advanced vocational training standards represent a consistently defined understanding of quality pertaining to the content and institutional and organisational modalities of such training: how, within a systematic learning process, to prepare learners for the demands of a skilled occupation in the labour market (initial vocational training) and/ or how to examine skills acquired in the course of work for the purposes of occupational advancement (upgrading training). This secures legal rights for all participants in initial vocational education and training: the companies, the trainees and advanced trainees – and,

not least, employers and customers, who can claim entitlement to performance of a defined quality.

Within the German dual system of vocational education and training, initial and advanced vocational training standards are the expression of a corresponding governance structure. Corporatist steering, labour-market orientation and the link to the principle of the skilled occupation contribute decisively to the productivity and efficiency of the German economy and create nationwide transparency and consistency of qualification objectives. Equally, the interlinkages achieved here between different reference systems (labour market, employment system, education system, individual rights of participation), the high degree of formalisation and the strong connection to institutions give rise to barriers and problems when it comes to the assessment, validation and recognition of occupational skills acquired outside this framework.

Against the background of this institutional framework, current initiatives in German vocational education for the validation and recognition of informal competences will be classified and reflected upon in the following discussion. After explaining the most important drivers for the establishment of a pathway towards the recognition of informally acquired competences, three approaches are discussed which either enable the recognition of informally acquired competences already or which are seeking to establish such a procedure. The common reference point is the attainment of a recognised vocational qualification or of a certificate equivalent to the formal qualification. These procedures are geared towards giving access to the skills of a recognised occupation and to improved employability as a result. By way of contrast, Section 4 of the Vocational Training Act (BBiG) mentions procedures for the assessment of competence which are meant to help with assessing the current status of personal development. Looking at these different recognition contexts, we reflect on what role certificates might occupy when it comes to valorising learning outcomes from informal contexts. The final question to be asked is in which way the formal system of awarding vocational qualifications will be challenged by the existence of a parallel recognition pathway.

2. Winds of change: Demographics, supply of skilled workers, and European initiatives create pressure to take action

Occupational proficiency and the principle of the skilled occupation are leitmotifs of dual initial and advanced vocational training, which enable the individual to plot a career path despite changing occupational environments. The labour market can thus rely on a continuous supply of skilled workers who are flexible, competent and have broad skill profiles. Within this system the acquisition of competence within the dual system, mediated through the skilled occupation/vocation and the occupational proficiency that underpins it, represent the reference system for the validation and recognition of occupational ability and experience. This system has come under pressure due to current developments in society and the economy. Consequently, the question of how occupational competences that were acquired

outside the dual system of training can be documented, validated and recognised is brought to the forefront. In this connection, the demographic trend in Germany and concern about the dependability of the supply of skilled workers proved to be central driving forces.

If we pay attention to the statistics, the urgency of the task is very clear: according to the Federal Statistical Office (2015) Germany's population will rise for the next five years and then fall again to its current level of 82.2 million by the year 2035. From then until the year 2060, a continuous decline to an eventual 76.5 million can be expected. In parallel with this development, the number of people aged 65 and over will rise from the current level of 17.3 million to 23.7 million people in the year 2060. The high immigration rates of the last two years only have a minor impact on the long-term population trend, according to the Federal Statistical Office (2015). Instead, the increasing "ageing" of the population, the noticeable decline in the number of school-leavers and the falling number of apprenticeship contracts will have a far more severe influence on the future supply of skilled workers, and hence, on safeguarding the effectiveness of the German economy.

The current Vocational Training Report of the Federal Ministry of Education and Research (BMBF, 2017) underscores this and emphasises that barely any other development will make such a mark on the German economy in the next few years as demographic change. Whereas around one in four (27.2%) training places remained unfilled in the training year 2013/2014, as compared with one in five (19.6%) two years earlier (Gerhards et al., 2015), unfilled training places reached a temporary peak in 2016 and an all-time high last year. The figure for unfilled training places reported to the Federal Employment Agency was around 43,500, some 4.5 per cent higher than in the previous year. Arithmetically, there were 104.2 offers of initial vocational training for every 100 school leavers (BMBF, 2017). According to findings from the third wave of the BIBB-IAB Qualification and Occupational Field Projections on qualification and skilled worker needs up to 2030, a shortage of *persons who have completed vocational education and training* will occur from the mid-2020s. Admittedly, the demand for this grade of qualification is expected to decline, but not as drastically as the supply of labour. Despite an increase in immigration, sufficient compensation cannot be achieved now that the high-birthrate years ("baby-boomer generation") are beginning to reach retirement age and leave the workforce (BIBB, 2014).

New approaches are also relevant with regard to European vocational training initiatives. Under the Copenhagen Process in 2002 a large number of activities were initiated, aimed at creating a standardised reference framework for vocational competences acquired throughout Europe – to operate alongside the existing different national vocational education and training systems and their qualifications. These culminated in the "Bruges Communiqué on enhanced European Cooperation in Vocational Education and Training for the period 2011-2020" in which the vision of vocational education and training in the Member States is described as being attractive, excellent and permeable, flanking employment policy, equipping the individual with competences and opening up perspectives (European Union, 2011). Central to all these initiatives is the "shift to learning outcomes" (Cedefop, 2009), in

which the main considerations are no longer credentials, qualifications or the forms of education in which competence was acquired, but rather, individual learning outcomes, understood as "statements of what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence" (EQF Recommendation 2009).

The learning-outcomes approach cuts across educational sectors and focuses on the learner personally; its implementation is found in the European initiatives for the establishment of qualification frameworks (European Commission, 2008), for the ECVET credit points system (European Commission, 2009), and for the validation of non-formal and informal learning (2012). The latter recommendation published by the European Council in 2012 called upon Member States "to put in place national arrangements for validation by 2018. These arrangements will enable individuals to increase the visibility and value of their knowledge, skills and competences acquired outside the formal education and training: at work, at home or in voluntary activities" (European Council Recommendation, 2012). The enumerated factors and reasons provide the framework for the discussions outlined below.

3. Formalisation of the non-formal: Legal regulations on the acquisition of an vocational qualification and/or on the assessment of "equivalence" facilitate access to the labour market

The validation of non-formal and informal learning has been possible in the German vocational education and training system for many years. This is frequently overlooked since the term "validation" is only gradually finding its way into German language usage, the impetus having been given by the Recommendation of the Council of 20 December 2012 on the validation of non-formal and informal learning. But ever since the 1960s, the *admission of external candidates to the final examination* (cf. Section 3.1 below) has provided an instrument within the Vocational Training Act, that regulates participation in a regular final examination without prior initial vocational training, and thus provides a means of validating non-formal and informally acquired competences.

People who have acquired vocational qualifications abroad are given a legal entitlement, under the so-called *Recognition Act* (cf. Section 3.2 below), to an evaluation of the equivalence of foreign vocational qualifications with German qualifications. Competences acquired abroad through professional experience or continuing education and training programmes are taken into account in the assessment of equivalence, if substantial differences have been noted in documentary comparison of the formal foreign qualifications and the German reference occupation. If exam certificates cannot be submitted for reasons that are not the candidate's fault, there is an option to carry out a skills analysis, which can also include non-formally and informally acquired competences. The most important prerequisite for this is always a vocational qualification acquired abroad.

Furthermore, in order to provide a similar validation option for adults educated in Germany, in 2015 the Federal Ministry of Education and Research (BMBF), working with the German Confederation of Skilled Crafts (*Zentralverband des Deutschen Handwerks*, ZDH) and the Association of German Chambers of Industry and Commerce (*Deutscher Industrie- und Handelskammertag*, DIHK) as the umbrella organisations of the competent bodies, initiated the *project "Qualification-Related Validation of Skills acquired non-formally and informally" (ValiKom)* (cf. Section 3.3 below). The target group consists of all people without formal qualifications who are over the age of 25 and have accumulated competences in the course of their work.

The approach chosen in ValiKom for the validation of non-formally and informally acquired competences – just like the Recognition Act – takes existing initial and advanced training regulations as its underlying standard. During the validation procedure, it is then possible – at variance with the examination for external candidates (which is a straight pass-or-fail examination) – for non-formally and informally acquired, occupation-specific competences to be assessed for full or partial equivalence with regular vocational qualifications, and then certified by the chambers, which are the competent bodies. In this way vocational competences that have been acquired in formal, non-formal and informal contexts become comparable with one another. Since the project is currently in its pilot phase, there is not yet any legislative basis for this validation procedure.

These three different procedures, which reference vocational qualifications and conform to the formal system of education, are presented below:

3.1 Admission to the final examination in special cases (examination for external candidates, Externenprüfung), BBiG, § 45(2) – a procedure for validating occupational experience

Admission to the final examination in special cases (known as the examination for external candidates, *Externenprüfung*) is not a separate examination for a special target group but an admission procedure aimed at giving access to the regular final examination in a recognised training occupation. The main groups addressed by the *Externenprüfung* procedure are unskilled and semi-skilled workers for whom gaining a qualification in a skilled occupation as mature candidates represents a second chance in the labour market. The *Externenprüfung* is also aimed at persons who have already gained a qualification in a different occupation and now wish to obtain an additional qualification. The admission procedure is implemented by the competent bodies. The purpose of this procedure is to ascertain whether the persons concerned fulfil the conditions to be admitted to the final examination. Access to the examination is open to those who can demonstrate occupational experience over a lengthy period of time in the occupation for which they wish to obtain a vocational qualification. In the wording of the law:

> Persons shall also be admitted to the final examination if they produce evidence that they have been employed in the occupation for which they wish to take the examination for a period at least one and a half times as long as is prescribed for the period of initial training. (BBiG, § 45 (2)).

On passing the examination, external candidates gain a regular qualification in a recognised training occupation – thereby acquiring evidence and certification of the competences acquired informally in the course of work.

Experience over many years shows that the final examination is a particular challenge for external candidates, since it is originally designed for persons who are completing a formal initial vocational training programme.

External candidates undoubtedly possess workplace experience resulting in the acquisition of practical competences; what they lack, however, is systematic reflection on their practical experience along with instruction in the theoretical content from in-company training staff and the teachers at a part-time vocational school. These cognitive and reflective skills, which are needed to pass the examination, cannot generally be acquired without intensive preparation through formal learning in the form of preparatory courses. They are obviously one reason why comparatively little use is made of the external candidates' examination procedure. In numerical terms, it has stood at an average of five to six per cent of all final examinations for many years, and the trend is declining. Successful examinees usually have a higher educational qualification, are younger, or have already completed an initial vocational qualification and want to switch to a different occupation (cf. Schreiber & Gutschow 2013).

3.2 Act to improve the assessment and recognition of foreign vocational and professional qualifications[2] (Gesetz zur Verbesserung der Feststellung und Anerkennung im Ausland erworbener Berufsqualifikationen, BQFG): the Federal Recognition Act

The "Act to improve the assessment and recognition of foreign vocational and professional qualifications" (shortened to the Federal Recognition Act) entered force on 01.04.2012 and aims to secure Germany's supply of skilled workers. The Act gives skilled workers from abroad an incentive to put their vocational qualification to use in the German labour market – and is seen, among other things, as a suitable instrument for attracting people from abroad to move to Germany. The Federal Recognition Act simplifies and standardises the procedures for the evaluation of foreign vocational qualifications regulated at Federal level, and opens these to previously unentitled target groups. The Recognition Act is an omnibus law. It is composed of several acts or amendments of existing laws and refers to over 600 occupations

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2   Retrieved from http://www.gesetze-im-internet.de/bqfg/ (in German) [30.07.2018]

which are regulated by Federal law.[3] The Recognition Act is geared towards improved labour market access – but is not applicable to

- the recognition of occupations regulated under *Land* law (to this end, since 2014 Recognition Laws have been passed in all federal states for occupations that are under the responsibility of the federal states (such as teachers, childcare workers, etc.),

- the recognition of university qualifications that do not lead to regulated occupations (e.g. mathematician, chemist, economist),

- the academic recognition of course attendance and examination performance abroad and in association with university admissions, and

- the recognition of school-leaving certificates (https://www.anerkennung-in-deutschland. de/html/en/federal_recognition_act.php)

The Recognition Act gives all people, regardless of nationality, a legal right to an individual assessment of their occupational qualifications. The evaluation looks at whether the qualification presented corresponds to one of the 600 occupations regulated under federal law (including the 325 training occupations within the dual system) – for this purpose the Act regulates for the first time the procedures and criteria for evaluating the equivalence of foreign vocational qualifications with the respective German reference occupation. In the course of a recognition procedure, the competent bodies evaluate whether the documents provided (reports, certificates, etc.) demonstrate the equivalence between a foreign qualification and a German one (the "reference occupation"). The evaluation is based on defined criteria such as the content and duration of training.

The prerequisite for an application, and hence the most important document for the formal evaluation, is evidence of a foreign vocational qualification. If substantial differences from the reference occupation are found, the second step is to examine whether these can be compensated for by other certificates of vocational competence. In this way, skills can be considered which were acquired on the informal pathway (occupational experience) or on the non-formal pathway (further and continuing education and training) – in Germany or abroad – and can be substantiated with corresponding documents (Böse et al., 2014). The candidate receives written notification of the evaluation result.

Since the Federal Recognition Act provides for a comparison of documents in order to ascertain their (partial) equivalence, it is equally necessary to have documentary proof of skills that were acquired through occupational experience, if these are to be included in the assessment; this is normally done by means of employers' references. This often gives rise to a problem because such concrete details of occupational activity and experience can rarely be

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3   It is only applicable when the legal regulations for the occupation do not contain any provisions on recognition. The special provisions in the occupational laws (e.g. for doctors or nurses) fundamentally take precedence over the BQFG and are to be used for equivalence procedures in these occupations (in keeping with the principle of subsidiarity).

proved by means of documents. In many other countries it is not such a common practice as in Germany to issue detailed employers' references. Often, although these provide evidence of a certain period of time in a company, they do not go into the content nor the duration of activities, nor do they give information about the quality of the person's work (BMBF, 2014). In 2016, decisions on around 20 per cent of procedures took occupational experience into account. Information is unavailable regarding how often applicants possessed occupational experience that could not be taken into account due to insufficient evidence.

Applicants do not always have the opportunity to provide evidence of existing qualifications, however. This applies particularly to refugees, whose documents, through no fault of their own, are frequently uninformative or incomplete. In such cases the Recognition Act also provides options: it is possible for applicants to provide evidence of occupational competences that are not substantiated through written documents by means of "other appropriate procedures" (cf. § 14 BQFG and § 50a para. 4 HwO) – e.g. by means of work samples or specialist interviews (BMBF, 2015). This procedure is called "qualification analysis" (cf. Oehme, 2012). Qualification analysis is an assessment of competence, not an examination within the meaning of the Vocational Training Act and the Crafts Code (cf. Kramer & Witt, 2012). Therefore, it is based on different procedural standards than, for example, an external candidate's qualifying examination in a skilled occupation. It is conducted by occupational experts, who are appointed by the competent body for recognition and document the results of their analysis. This documentation is referred to during the further processing of the application for occupational recognition, and for the evaluation of equivalence described above. Qualification analysis is a component of a recognition procedure, meaning that here once again, an occupational qualification remains a formal prerequisite for access.

Increasing use is being made of the instrument of qualification analysis: in the five years from 2012 to 2016, the competent bodies for chamber occupations reported a total of 483 decisions by other appropriate procedures, and a rising trend can be noted, from 60 per year at the beginning of this period to 126 per year most recently. The effort of designing and implementing a qualification analysis is considerable but decreases as the implementing chambers gain in experience. This is balanced, however, by very encouraging results from the procedures. The competent bodies found full equivalence in over half of their decisions (50.9 %) and partial equivalence in a considerable proportion (35.6 %) of other cases (Erbe, 2017; in this regard cf. also further results of recognition monitoring in BMBF, 2017, p. 39 and Böse, Tursarinow, & Wünsche, 2016).

3.3 The ValiKom ("Qualification-related Validation of competences acquired non-formally and informally") pilot project

The political background to the BMBF-funded cooperative project for the "Qualification-related validation of skills acquired non-formally and informally" (ValiKom)[4] is the EU Council

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Recommendation of 20 December 2012 on the validation of non-formal and informal learning, together with the fact that only holders of qualifications obtained abroad can benefit from the provisions of the Federal Recognition Act. The project is currently in its pilot phase and is deliberately tapping into the experience gained in qualification analysis by the various chambers as they apply the Recognition Act. It is aimed at persons who have acquired occupationally relevant competences either in Germany or abroad but do not have a formal vocational qualification to prove this. The target group thus consists of both (formally) low-qualified workers and people who have switched tracks or upgraded within the initial and continuing vocational education and training system and are now working in an occupation other than their original training occupation. Participants must be at least 25 years old. Essentially it makes no difference whether their occupational experience was acquired in Germany or abroad. Particularly persons who are low-qualified in formal terms will often find it more difficult to provide evidence of their skills in a formal examination situation (such as taking the qualifying examination in a skilled occupation as an external candidate), which is why this type of validation procedure is very appropriate for this target group. Unlike the external candidates' examination, one of the possible outcomes is a determination of partial equivalence. In these cases the certificate gives information about the skills ascertained in relation to the reference occupation. This means that, on the one hand, it provides transparency for potential employers and can thus improve the holder's labour market prospects. On the other hand, participants can proceed to remedy the gaps in their competences, if any, by pursuing the second-chance qualification pathway to obtain a full qualification in a skilled occupation/vocation.

The project is being implemented by the Western German Confederation of Chambers of Skilled Crafts in cooperation with four chambers of skilled crafts and four chambers of industry and commerce, with scientific backup from the Research Institute for Vocational Education and Training in the Crafts Sector at the University of Cologne. The competent bodies advise interested persons on the validation procedure and on the documents that are required. Moreover, they provide support in selecting the appropriate reference occupation to be used as the basis for the equivalence assessment. In the subsequent procedure, an evaluation is conducted of how far the person's competences are adequate for performing the chosen reference occupation.

The initial components of the application to take part in a validation procedure are a report and self-assessment (referring to developed questionnaires). The application documents are evaluated by the chamber. The aim of the evaluation is to determine which aspects of work associated with the reference occupation will require external assessment. This is carried out – as in the case of the qualification analysis – by experts in the occupation. The external assessment may make use of different practice-oriented instruments such as work samples or specialist interviews. The result of the external assessment is communicated to the responsible chamber. The chamber issues a validation certificate, which certifies that the

	Objective	Procedure	Main stakeholder	Recognition
Final Examination at the Awarding Body (BBiG § 45, sec. 2)	Supporting unskilled workers to pass the examination of a recognised training occupation in order to gain status and to be employed and paid according to collective bargaining agreements (industry) and to broaden occupational responsibility (craft).	Individuals hand in guided documentation and give proof of their previous work experience in the related occupational or professional field. The recognition procedure is finalised when the applicant successfully passes the final examination (= identical with the final examination of the apprenticeship).	Awarding body (decides on the admission to the final examination (based on evidence of employment experience)	Entitlement
The Federal German Recognition Act (assessment and recognition of professional qualifications obtained in other countries)	Integration of people with foreign qualifications already living in Germany and attracting people from abroad to come to enter the German labour market.	The awarding body determines on an individual basis whether the qualification a person has obtained abroad corresponds – partly or entirely – to a specific German occupation.	Awarding body	Equivalence
Pilot initiative ValiKom	increasing skill visibility (of those who have no formal proof in the form of an vocational certificate) and thus increasing opportunities for applicants on the job market	During the first phase, existing documents on the participant's educational and working background are evaluated to assess the skills acquired. On this basis, the vocational skills are identified and assessed through practical means, e.g. a sample of work or a specialist interview. The procedure model is currently being trialled by project partners.	Awarding bodies	Multifold: transparency, partial, full equivalence

Figure 1: Drivers and approaches towards formalising competences acquired outside the formal frame – three procedures, focusing on the main characteristics

competences acquired are fully or partially equivalent to those acquired during the process of training to qualify in the reference occupation.

Currently around 160 validation procedures are being conducted up to the end of 2018 in order to pilot the developed procedure and gain experience in applying it. Once the pilot project has been concluded, it is envisaged that consultation will take place about establishing a legal foundation for the implementation and certification of such validation procedures.

4. Approaches to rendering visible and reporting individuals' informally acquired competences

Alongside these approaches there are a considerable number of procedures for the reporting (citation) of competences acquired from working practice and from the lifeworld, the recording of which is significant in terms of their relevance to a skilled occupation as well as the requirements of any given company. Many procedures are aimed mainly at determining the individual's current status in order to initiate and perhaps support career development. They set out to provide individuals with methodical instruction and support in self-reflection. Some procedures provide for both a self-assessment and an external assessment.

The AiKomPass pursues the objective of recording and documenting informal and non-formal competences that have been acquired through work or free-time activities so that these can be used by employees for their subsequent occupational development and for competence-recognition purposes. The project's focus is on semi-skilled and unskilled persons and the group of skilled workers in the metal and electrical industry. On the basis of reporting procedures such as Europass, Youthpass or ProfilPASS, competence and skills portfolios are produced which document existing competences, which have been acquired in the most diverse formal, non-formal and informal learning situations, as broadly and open-endedly as possible. Competence and skills portfolios are used in guidance settings or in the workplace context for personnel management and human resources development. Beyond this context they have little significance for occupational recognition on the basis of certificates with substantial market value.

The most widespread profiling procedures in the company context, such as KODE®, are often requirement-oriented. They identify concrete action competences and are intended to support the competence development of persons, groups, teams and organisations. Action competences are supposed to equip individuals to deal with new challenges and situations more effectively. The diagnostic's objectives make reference to firmly defined competences and sub-competences. The diagnostic is built upon, as with KODE®, to develop individual competence and skills profiles which document strengths and weaknesses including an assessment of resilience in problematic situations, among other things (cf. Erpenbeck, 2007).

Beyond this, there are various other instruments which were developed in order to support guidance to improve the integration of refugees into initial and continuing vocational education and training and the labour market.

5. Does the German system of vocational education and training need an autonomous approach for the recognition of informally acquired competences? Open questions and design requirements

What do these existing options offer in terms of potentials and starting points for broadly anchoring the recognition of informal learning in German vocational education and training?

Admission to the final examination in special cases, known as the external candidates' provision (§45 (2) BBiG)) has been the traditional means within German vocational education for making occupational experience and competences visible. Within this framework, full recognition of occupational equivalence can only be obtained by passing the final examination. It can thus be classified as part of the formal system. It does not provide the option of credit or certification of proven learning outcomes (Schreiber & Gutschow, 2013). This would only be the case if the final examinations themselves were learning-outcome-oriented, i.e. formulated on the basis of competence standards. Until now, while training regulations have been geared towards the objective of attaining occupational proficiency, they are largely based on a structuring principle geared towards qualifications. Currently, there are no revised competence-oriented versions of training regulations.

The Recognition Act is generally concerned with recognition of formal learning acquired abroad, on the basis of a comparison of the applicant's documents with German reference occupations. Only in the absence of documents can occupational competences acquired in different contexts and countries be validated by means of the instrument of qualification analysis. A corresponding certificate is then issued, recognising the validated competences as equivalent to the German qualifications. So far this option, defined in the legislation, has only applied to persons who have acquired occupational qualifications abroad but have been unable to document them.

German-educated individuals have no legal entitlement to have a qualification analysis carried out – currently the "admission to the final examination in special cases" (examination for external candidates) is the only avenue open to them. This gap is likely to be filled on the basis of experience and results from the ValiKom project, although so far it is only a pilot initiative being institutionally supported by actors from industry.

Shared responsibility among the stakeholders, which is a legal stipulation for initial and advanced vocational education and training, has not yet been put in place. The aim, however, is Germany-wide implementation in order to ensure that recognition practice in Germany guarantees flexible access to skilled occupational status.

The intention is to extend the ValiKom initiative to more occupations in a subsequent pilot phase so that it is no longer confined to particular occupations and sectors. If this is implemented successfully, a general legal entitlement to evaluation of the equivalence of informally acquired competences will be realised. This can be done by means of legislation to make it sufficiently binding. Only in this way will the German system of vocational educa-

tion and training have established an autonomous approach to the recognition of informally acquired occupational competences.

The majority of ValiKom's trial validation procedures so far have related to initial vocational training. A particular challenge that lies ahead is the validation and recognition of learning acquired informally in the course of employment after initial vocational or academic training.

On the way to an autonomous system for the recognition of informal learning, a series of problems and design requirements remain, which necessitate further research and development tasks. For example, so far it remains unclear who bears the costs of the elaborate validation procedures, including accompanying guidance. A shared financing arrangement between public institutions and individual applicants is under discussion. Linked to this are questions of equitable access, particularly for persons needing special support in order to enhance their career development and employment opportunities.

Another question that remains open is which institutions are suitable to award certificates. Should the same institutions that award qualifications in the formal system be able to issue certificates of equivalence? In Germany, these are generally the chamber organisations, which are industry-based institutions. Conversely it may be asked whether an institution that is independent of industry is capable of instilling certificates of equivalence with the same kind of market value that attaches to vocational qualifications in the formal system.

A further problem is the selection of suitable methods for the assessment of competence. In ValiKom, a report and self-assessment is required as a basis for the procedure to apply for an external evaluation of the relevant skills and competences. Depending on the field of activity and acquired competences, occupational experts may select specialist interviews, work samples, role plays, trial tasks in the company, case studies or presentations of work results as instruments for assessing competence, and develop tests accordingly. A range of practical implementation problems were reported from the first ValiKom funding period, e.g. the creation of objective conditions for practice-oriented tasks to be evaluated externally. The tasks themselves exhibit a low degree of standardisation and thus produce considerable problems regarding the relevant quality criteria, which need to be incorporated into the design of such procedures.

The competence assessment instruments used focus markedly on practical fulfilment of tasks and place comparatively little emphasis on discussion of the requisite specialist knowledge. For more complex occupational activities with broader scope for decision making, however, specialist knowledge in particular along with various cognitive skills (analysis, reflexion, planning and organisation) are important prerequisites of occupational proficiency (Nickolaus & Walker, 2016). Hence, there is a need to develop instruments which contribute to making the applicant's knowledge visible even though it is mostly embedded in experience, and revealing possible further qualification and support needs. Validation procedures require highly applicable and well-founded diagnostic procedures for competence assessment in order to legitimise learning as equivalent, and thus to ensure high acceptance of

the certificates for access to further levels of occupational competence development and to positions in the employment system.

A decisive question concerns the possible market validity and informativeness of certificates of equivalence in comparison to formal qualifications in the employment system. Generally a function of certificates is to *document* individuals' learning and, to evaluate it with reference to predetermine standards; this renders a person's knowledge and ability recognisable to third parties. Certificates are helpful in the selection of candidates for occupational positions and thus possess a *selection function*. Certificates give technical starting points for decisions on staff deployment; i.e. they are used as a basis for the allocation of functions or workplaces (technical function). They confer legally regulated access to occupational fields of activity or entitlements to exercise certain functions (cf. Käpplinger, 2007; Severing, 2011). Certificates from recognition procedures ought to fulfil all these functions if they are to achieve actual equivalence with formal occupational qualifications. In which way certificates of equivalence lead to professional success and open up further career development perspectives for individuals is an unanswered question so far, due to a lack of systematically designed studies tracking the destinations of successful validation applicants and the use of their certificates. Initial findings from a study on the labour market success of individuals after completing the recognition procedure show that their integration into the labour market improved considerably. Former applicants were more frequently in active employment, for longer periods of time and more appropriately to their qualifications than at the time of the application. Furthermore, on average, those surveyed earned higher employment incomes after recognition. 72% of those surveyed rated their own occupational situation as better than before. There was around a fourfold improvement in the chance of a person with a foreign qualification working in the occupation for which they originally trained (Ekert, Larsen, Valtin, Schröder, & Ornig, 2017, p. 87).

However, evidence and documentation is lacking on the acquisition of practical knowledge and competences from the work process as a result of occupational experience. Admittedly, competence and experience, e.g. jobs held within companies, are taken into consideration. Nevertheless, their market value remains limited in the German employment system. Employers' references can document the performance of activities, including the aspect of quality of performance. Because of their different design and the associated scope for interpretation, however, unlike certificates from continuing education they do not represent evidence of competence but, at best, indications of the presence of skills.

It is therefore vital to incorporate the acquisition of occupational competence after initial vocational or academic training into education policy initiatives. For the further development of the system, consideration therefore needs to be given to validating and recognising competences that lead to higher visibility and market value in the employment system. Questions that remain open in this area relate to recognised standards as references for validation procedures, since they only exist for a limited number of advanced training occupations as

yet, and only cover a small portion of company-based and vocational competence development.

Finally, it is worth asking what influence the existence of recognised validation procedures exerts on educational choices overall. Will a system for validating informal competences lead to a decline in institutional forms of initial and continuing vocational education and training? Are young people, for example, less motivated to take up an apprenticeship if there is a prospect that a job that does not prepare them for a formal qualification will be better paid than an apprenticeship? Do non-monetary benefits of initial vocational training, such as targeted structured learning in the workplace supported by trainers and teachers, and do the subsequent prospects of development that follow on from an apprenticeship, play a role in young people's choice of an apprenticeship?

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Prospects

Borhène Chakroun

▶ Work-based Learning: A Research Agenda for New Policy Challenges

1. Introduction

Work-based learning, in particular apprenticeship, is drawing increased attention as part of the global debate about technical and vocational education and training (TVET) and the role it plays in national sustainable development agendas. Defined broadly by the Inter-Agency Group on TVET (IAG-TVET), work-based learning refers to all forms of learning that takes place in a real work environment. It provides individuals with the skills needed to successfully obtain and keep jobs and progress in their professional development. Apprenticeships, internships/traineeships and on-the-job training are the most common types of work-based learning. These types usually – but not always – combine elements of learning in the workplace with classroom-based learning (IAG-TVET, 2017).

In July 2017, the United Nations Educational, Scientific and Cultural Organization (UNESCO) convened an international conference in Tangshan (China) to debate current trends and future drivers of the development of TVET since the Third International Congress on TVET in Shanghai, held five years earlier. This global dialogue culminated in the Tangshan statement (UNESCO, 2017), a key message of which is the need to promote quality-assured work-based learning in TVET programmes and to support the development of the workplace as a learning environment. The 2015 UNESCO recommendation for TVET also articulates the need to promote work-based learning:

> Work-based learning in its various forms, including in-service training, attachments, apprenticeships and internships, should be promoted. The quality of work-based learning should be enhanced and when relevant be complemented by institution-based or other forms of learning (UNESCO, 2015a, p. 1).

Work-based learning is also featured frequently in the strategic and operational planning of regional economic communities (RECs) and international organisations. As an illustration, the European Union new skills agenda calls for more work-based learning and business-education partnerships. The agenda considers that more people should be able to benefit from

this way of learning. The African Union's continental strategy for TVET to foster youth employment (Africa Union, 2016) emphasises the critical role of the productive sector, through its own organisation, especially in terms of chambers of trade or brotherhood, in driving the process of defining the skills necessary to the economy and the organisation of work-based learning.

At global levels, the G20 Employment and Labour Ministers have highlighted the importance of developing quality apprenticeship programmes, which can provide businesses with the skilled workers they need to succeed in a rapid changing global marketplace (OECD-ILO, 2017). The Organisation for Economic Co-operation and Development (OECD) also has a flagship initiative regarding work-based learning in vocational education and training. The initiative covers six key themes: the costs and benefits of apprenticeships; strengthening incentives and implementation for apprenticeships; work-based learning for youth at risk; work-based learning and productivity; recognising skills acquired through work-based learning; and work-based learning and career guidance (Kis, 2016).

Several international and regional organisations have developed approaches and tools to support the promotion of work-based learning. For example, the European Training Foundation (ETF) published a handbook for policy-makers and social partners to understand some of the ways in which learning in the workplace can be encouraged and how its quality can be improved (ETF, 2014). More recently, the International Labour Organization (ILO) produced a Toolkit for Quality Apprenticeships (ILO, 2017) with the view to improve the design and implementation of apprenticeship systems and programmes internationally. It provides examples of good practice from ILO constituents around the world and guidance for policy-makers and practitioners.

Work-based learning is also attracting the attention of Development Banks and bilateral donors. For example, the Inter-American Development Banks examined the relevance of apprenticeship for Latin American and Caribbean countries in the context of the 21st century challenges. Another noteworthy initiative is the Dual Vocational Education and Training Development Cooperation group, which involves different bilateral organisations active in the field, including the Swiss Agency for Development and Cooperation and the German Agency for Cooperation (GIZ).

Given the diversity of country contexts, it is remarkable how much consensus exists around the idea that skills development through work-based learning is a key TVET reform dimension and a crucial factor for productivity and economic growth and for improving relevance and enhancing youth employability. Yet whilst work-based learning occupies an important place on policy agendas, the capacity of countries to develop quality work-based learning systems and to respond to multiple and elevated demands is uneven, and in many countries often limited. Furthermore, the rapid technological change and the disruptive factor of digital technologies is affecting the demand for skills and calling for new forms of partnerships with industry and new learning venues well-integrated within lifelong learning systems.

Drawing on these developments, it is possible to identify areas of research in the growing debate on modern work-based learning and single out complex interactions that occur within and across local and global levels in this field. A multi-disciplinary approach is required to provide a broad perspective on the institutional, organisational and pedagogical aspects of work-based learning (Rainbird et al., 2004; Education Permanente, 2012; CEDEFOP, 2015). However, given the fast-changing landscape, this is not sufficient; there is a need for a robust evidence-base and research to inform the debate and, in some cases, to counterbalance the often over-optimistic assumptions made about the potential of work-based learning. Simply transferring models from one setting to another is unlikely to prove adequate or feasible. Rather, policy learning processes are required (Chakroun, 2010).

This situation, therefore, begs for four broad research questions: What are the main features of the interplay between the global and local contexts influencing work-based learning development? How are the digitalisation of economies and labour markets influencing work-based learning? What kind of approach is likely to enable countries to develop and implement quality work-based learning models relevant to their national contexts? And what is the role of international networks, such as the UNEVOC Network, in this context?

The next sections outline major research areas that should be considered to address these questions.

2. The sustainable development context of work-based learning

Historically, an economic perspective has dominated much of the conventional thinking about the purposes of work-based learning. Attention has been focused on how to provide people with the knowledge and skills required to support higher productivity, sustained growth and competitiveness. The evidence that work-based learning contributes to firms' productivity and wages is well established. The World Bank Development Report on Learning (World Bank, 2018, p. 154) provides concrete examples from different country contexts, including Latin America and Caribbean, Asia and Africa. For example, in Mexico, investments in training increased productivity and firm-level wages by 4–7 per cent for manufacturing workers. Similarly, returns were 7.7 per cent in Malaysia and 4.5 per cent in Thailand for workers holding a secondary education qualification or more. In Kenya and Zambia, workplace training was associated with a 20 per cent increase in the wages of manufacturing workers (idem).

The economic emphasis, while it remains important, is being challenged by a sustainable development perspective. Such a perspective includes – beyond economics – social and environmental sustainability dimensions, which are key in the context of Education 2030 (UNESCO, 2015b). However, less evidence is available regarding the contribution of work-based learning to equity and gender equality, and even less to environmental sustainability. At the same time, researching the significance that work-based learning has in any given country and perception of its contribution to sustainable development, are dependent on

the nature of the TVET system, the relationship between state, social partners – where and when they exist – labour and capital, and more broadly the production system. The research and analysis of the ways work-based learning is combined with other policy measures is also crucial. Work-based learning programmes will be ineffective in driving TVET reforms if they are not complemented by policy measures to change institutional arrangements, e.g., governance and social partner roles and responsibilities. In this perspective, a socio-economic, context-specific view is more relevant than a technical view. Its value lies in social factors such as partnerships and the power and influence of stakeholders and organisations involved in TVET.

What is clear is that further research and evidence is required to support the importance of an integrated economic, social and environmental approach (UNESCO, 2015c). It has to be evidence-informed whilst also having value for the policy-makers and practitioners in the TVET community.

3. Work-based learning in digitised economies and labour markets

There is increasing evidence of digitalisation of economies and societies. The world is becoming universally connected, with an estimated 95% of the global population living in an area covered by at least a basic 2G mobile-cellular network. In 2017, the world will mark a significant milestone: 50% global internet penetration (A4AI, 2017). To fully seize the opportunities and to mitigate the undesirable outcomes, it is critical to map and develop the skills required by jobs and economic and social inclusion in the connected world. A report from the World Economic Forum describes the challenge in these terms (World Economic Forum, 2016): "Disruptive changes to business models will have a profound impact on the employment landscape over the coming years. Many of the major drivers of transformation currently affecting global industries are expected to have a significant impact on jobs, ranging from significant job creation to job displacement, and from heightened labour productivity to widening skills gaps. (…) In such a rapidly evolving employment landscape, the ability to anticipate and prepare for future skills requirements, job content and the aggregate effect on employment is increasingly critical for businesses, governments and individuals." The key development question is how societies can reap the 'digital dividends' of digitalisation, whilst minimising the 'digital divide' between those who benefit from digitalisation and those who do not. Digitalisation possibly presents opportunities for developing countries' emerging economies to catch up with more mature economies and to 'leapfrog' some stages of industrial development (Orr et al., forthcoming).

Because TVET including work-based learning needs to both respond to demands and shape its future contexts, one of the main concerns is to develop effective work-based learning strategies to promote virtuous interactions between education and training and the world of work, and how the new modes of work and digitalisation of economies and labour markets will influence work-based learning. For instance, Weiss (2015) considers that in a

world of digitalisation and automation, TVET needs to be upgraded to what he calls Vocational Education and Training 4.0. UNESCO considers that changes in modalities of access and learning methods, massification and internationalisation, are taking place in particular through Massive Online Open Courses (MOOCs). New forms of certification, including digital credentials and open and online badges, are supporting recognition and validation of formal, non-formal and informal learning (Keevy & Chakroun, forthcoming). Real-time data and data analytics are complementing traditional labour market information systems with a more timely monitoring of changing demand for skills (UNESCO, forthcoming).

While it is difficult to predict and plan in detail for the potential changes that might affect the world of work in years to come, it is important that new research looks at how demographic changes, globalisation and technological progress will affect the workplace and its inclusiveness - and what this means for work-based learning.

4. Policy learning to support work-based learning

As suggested in the introduction of this article, in recent years the call for the development (and in some cases export) of work-based learning models, particularly apprenticeship and dual systems, has become loud. In this context, several researchers and observers are quite sceptical as to whether such policy borrowing is successful (Euler, 2013; Gonon, 2014; Linten et al., 2014). Policy borrowing and lending is about the transfer of policies from one political system to another. Ochs and Philips (2004, p.8), for instance, note a continuum in the dynamics of education transfer processes, ranging from reforms that are imposed (policy lending) to those that are more voluntarily sought or accepted (policy borrowing). In contrast, policy learning puts a strong emphasis on the development of national capacities to lead the design and the implementation of TVET reforms (Grootings, 2004; Raffe & Spours, 2007; Chakroun, 2010). Policy learning builds on the assumption that policy options lie in each country's own political, institutional and cultural context. It is in conflict with traditional technical assistance and project management approaches.

An important mechanism used for policy learning is networking and peer learning (Chakroun, 2010). Making networking and learning from peers an important part of the policy learning process can result in forming and maintaining a strong contact base, experience sharing and learning, exploring successful initiatives, identifying new developments, discussing experiences that can be a useful eye-opener and help to redirect national discussions into hitherto unknown policy territory.

UNESCO's Recommendation for TVET (UNESCO, 2015) suggests that Member States should consider sharing knowledge, experiences and promising practices, reinforce international TVET data collection and make use of international and regional networks, conferences, and other fora. In this context, the UNEVOC Network is a strategic resource available to Member States for mutual learning and advancing international cooperation in TVET, and more particularly for work-based learning. Promoting work-based learning through net-

works and peer learning requires bringing together policy-makers from different countries to discuss approaches to reforming systems and to analyse policies deemed to deserve wider attention and scrutiny. Peer learning can serve a variety of policy-related purposes, including understanding work-based learning systems better by contrasting them with others, identifying common trends and pressures, clarifying alternative policy strategies and identifying issues that could arise from each option.

For around 25 years, UNEVOC has been consistently seeking evidence and case studies of promising practices and innovation in TVET, including work-based learning. UNESCO-UN-EVOC set-up a range of programmes and mechanisms for supporting peer learning. For example, the e-forum is a global platform connecting the TVET community across borders and allowing peer learning and knowledge sharing to happen in an open manner. Another example is the TVET Leadership programme, which proposes approaches to producing, sharing and using knowledge different from those used in traditional technical assistance. It focuses on the capacity of participants (mainly policy-makers in specific countries) to learn from their own experience and from that of other countries, in ways that strive for a deeper understanding of policy problems and processes than what is provided by simply seeking and implementing best practice. Finally, the UNEVOC Network develops, collects and shares resources on TVET, including work-based learning useful for researchers, decision-makers and practitioners. The UNEVOC Network peer learning processes facilitate not only North-South, but also South-South and North-South-South dialogue, providing opportunities for countries to learn from each other. It provides a valuable opportunity for members to build collaboration and further learning opportunities.

Examining practices of successful networks in promoting research, knowledge sharing and peer learning is an area that requires further research and analysis.

5. Conclusion

This article started by demonstrating that work-based learning is positively considered as a key TVET reform. It emphasised the shift of policy objectives of work-based learning from only economic and productivity perspectives to a sustainable development paradigm. In this context, Education 2030 has the potential to both reinforce work-based learning as a key driver of reforms in a lifelong learning perspective, and to connect the analysis of work-based learning with intended sustainable development outcomes. The article concludes that developing work-based learning through policy learning and networking holds more promise than borrowing models from elsewhere. It points to the importance of international networks, particularly the UNEVOC Network, in this context.

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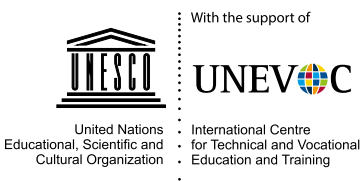Email: l.unwin@ucl.ac.uk

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▶ Abstract

This book provides a rich collection of research and practice perspectives around central topics in the field of work-based learning (WBL). Based on an extensive prior literature review of the current state of research on WBL in TVET contexts on a global scale, key themes of interest for a competence-based perspective were chosen to call for contributions from researchers and experts in VET from all around the world. Inspired by research evidence from a diversity of recent national projects, the book offers new insights in conducive factors for learning on the level of the individual subject and the work environment. The papers pick up regional and national challenges in supporting WBL and in developing and implementing curricula based on actual work processes. They take a closer look at the role of tutors in WBL and show new options in the transfer and recognition of knowledge, skills and competences. The research approaches presented in this book are meant to support everyone in meeting their TVET objectives, regardless of region and scale.

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