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Transforming vocational education and training in Finland: Uses of developmental work research approach

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Abstract

Vocational education and training (VET) is under reform in many Nordic countries. This article explores uses of developmental work research (DWR) approach in reforming and transforming practices of VET. DWR was initiated in Finland in the 1980s to enhance understanding about learning in organizations. The aim of this article is to elaborate the approach by examining studies made in the field of professional and vocational education and training, and thus to examine potentials and shortcomings of the approach. Eight DWR studies in the field of professional and vocational education and training are summarized, and three of them are elaborated. Contributions of the studies cover new tools, conceptualizations and methods for VET. Shortcomings bring forth researcher's dual role and lack of evidence on sustainable development after study processes. In conclusion I state that DWR offers rich and solid theoretical and methodological tools for VET researchers. However, they need to develop concepts that combine different dimensions of research, and not to forget to elaborate their study results from societal and individual perspectives.

Keywords: developmental work research, cultural-historical activity theory, vocational education and training

Introduction

A recent research project compared vocational education and training (VET) systems in the four Nordic countries (NordVet, n.d.). The researchers aptly pointed out that vocational education systems differ in the Nordic countries, for example, the history of the labour market in each country has effected the development of the VET system; Finland and Sweden has more school-based VET than Denmark and Norway (cf. Stenström & Virolainen, 2014). The VET focuses on improvement of skills and knowledge needed in working life, and the Nordic countries have a rich research agenda for improving and developing VET (cf. Helms Jørgensen, 2015; Persson Thunqvist, 2015). My focus is on a specific approach developed in Finland: developmental work research, and how it has been used to study and develop practices in the VET field.

DWR was initiated by Yrjö Engeström (1998) and his colleagues (Engeström, 2005) when tackling with research and development work in organizations in Finland in the 1980s. They wanted to explore learning in organizations and argued that traditional theories of learning did not cover future-oriented learning. Traditional theories of learning assumed that things that needed to be learned existed somewhere such as in textbooks or in practices of experienced colleagues. Engeström (1987/2015) called the new theory of learning *expansive learning* trying to grasp something that was not yet there. From very early on, DWR was connected to historical forms of work and transformation of work (Engeström, 1998). Since its start, DWR has been implemented in several organizational change efforts in Finland and also internationally[1]. In the field of VET, several transformations have occurred and DWR has been employed to capture those transformations.

Today, initial VET in Finland takes three years of full-time study. Prior learning can shorten the study time. Each qualification includes also on-the-job-learning and gives eligibility for higher education (universities and universities of applied sciences). VET is placed in the ISCED classification system on level 3–4. The VET system is currently under reform, which aims at strengthening interaction between educational institutions and working life by putting heavy emphasis on a competence-based approach. Furthermore, government's budget cuts form a big challenge to VET (OKM, n.d; OPH, 2012). Three of the DWR-studies introduced here (Tuomi-Gröhn, 2003; Härkäpää, 2005; Lukkarinen, 2005; in Table 1) were conducted in upper secondary vocational education institutions: the focus was on the concept of developmental transfer and on co-operation between working life and education.

Universities of applied sciences (UAS) are part of the Finnish higher-education system. They are on level 6–7 in the ISCED classification system. A bachelor degree takes 3.5–4.5 years of full-time studies. A master degree takes 1.5–2 years (OKM, n.d.; OPH, 2012). Three studies presented here (Konkola,

2002; Hyrkkänen, 2007; Ahokallio-Leppälä, 2016; in table 1) used the DWR approach to develop practices of higher education focusing on: collaboration between school and work, evolvement of research and development concept, and development of human resources management. Vocational teacher education, in the Finnish system, is mostly organized at universities of applied sciences. Pedagogical training takes one-year full-time study. The Swedish language vocational teacher education is organized at the Åbo Akademi University. Lambert's (1999) study focused on vocational teacher education.

Developmental Work Research approach

DWR bases on cultural-historical activity theory (CHAT) and scholarly works of Vygotsky (1978), Leontiev (1978) and their followers (e.g. Cole & Engeström, 2011). Concepts of mediation, activity and activity-system model, object, contradictions, historicity, and multivoicedness are frequently employed in DWR studies (Engeström, 2001). Concepts interrelate general principles of CHAT into the specific context and local situation of the studies. I will give some examples of how these concepts are employed in relation to DWR studies.

Mediation of activity, such as learning activity, means that learning is not a direct reflection to some stimulus, but is mediated through cultural tools and signs (Vygostky, 1978). For example, in the area of professional and vocational education, the study by Teräs (2012) examined how the immigrant students faced a new mediating tool of learning, namely 'paper' in their education. Different types of papers such as assignments and textbooks were read and written, carried and copied in the activities of learning and studying in the vocational college. For immigrant students the activity of learning involved new tools and methods, which needed to be learned.

Contradictions are perceived as driving forces of development and learning (Ilyenkov, 1977). In DWR studies, it means that contradictions are manifested as disturbances, ruptures, tensions, and innovations in activities, therefore it is important that researchers identify them (Engeström, 1998). Lukkarinen (2001) identified and analysed disturbances in vocational teachers' work during a developmental project when on-the-job-learning was included in trainings. She identified disturbances such as student groups being smaller than before, resistance to research work and non-participation in trainings. As the result of her analysis, interventions were organized to overcome disturbances and to find new solutions to the training.

Hyrkkänen (2007, p. 81) identified the new object for teachers in universities of applied sciences when looking at new demands in teachers' work: teachers work involved also research and development, not only teaching tasks. Konkola (2000) organized an intervention called 'collective remembering' to make visible the history of occupational-therapist education. She used various artefacts such

as photos, things, and a memory-map to focus discussion on developmental phases and changes of the training. Heikinheimo (2009) examined different voices of instrumental music lessons and focused especially on intensity of interaction between the teacher and the student. He identified, for example, voices of musical ideal and musicianship in communication of teachers and students.

DWR is perceived as an interventionist approach, which combines scientific inquiry, practical development work, and expansive learning (Engeström, 1998). Phases of DWR are often depicted as a methodological cycle with five steps, following the seven epistemic actions of expansive-learning cycle (Figure 1). 1) Starting from charting the present situation, 2) analysing contradictions between development history and present, 3) supporting and analysing the planning of the new activity model, 4) supporting and analysing the implementation of the new activity model, and 5) reflecting on, spreading, and consolidating the new activity model (Engeström, 1998).

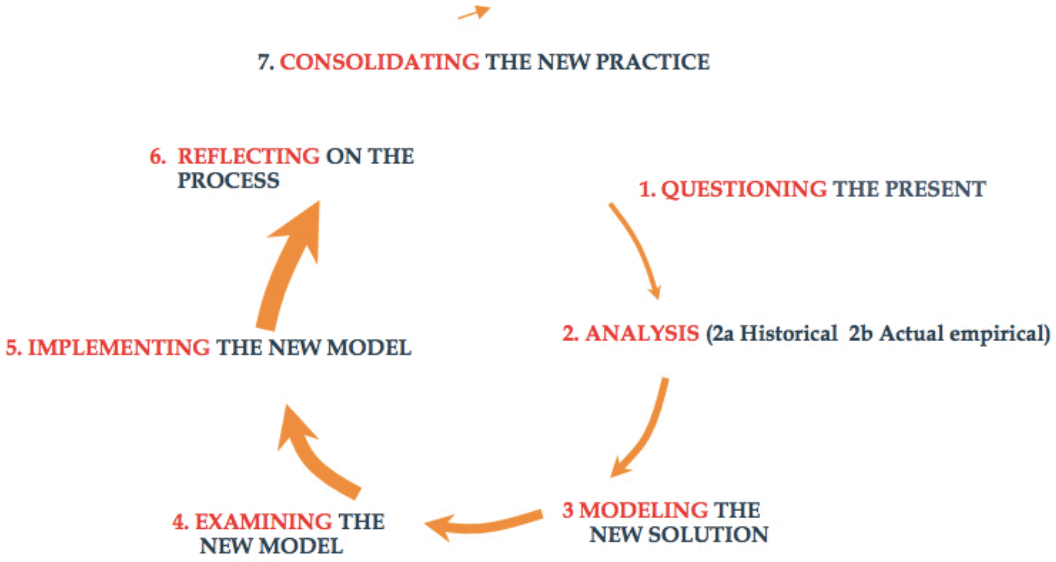

Figure 1. Seven actions of the expansive learning cycle (modified from Engeström, 1999, p. 384).

Results of DWR are typically presented in three ways: practical tools for development such as manuals or new methods, intermediate concepts to conceptually manage work practices and situations, and new methods and scientific ideas for science. (Engeström, 1998). For example, the teachers of the oral-hygienist training used DWR to develop their practices within the training (Keto, Nuutinen & Teräs, 2010). It had been a longitudinal process covering several years from the beginning of 2000. In the first phase, the teachers identified the challenge of the present situation: how to integrate working life and teaching

practices of oral-hygienist training. In the second phase, they dwelled into the history of oral-hygienist training. In the third phase, the teachers produced a new model called 'collective expertise' illuminating co-operation between dentists and oral-hygienists in working life. The new model acted as a future-oriented vision for development of the training. The challenge was to find out how these two professional groups could work together already during education. In the fourth phase, the model was further developed and called 'a health-oriented teamwork-model', and put into practice. Dental students and oral-hygienist students started to take care of periodontal patients together during their internships. In the last phase, the model was consolidated, and it was found that in co-operation between several actors and institutions (oral-hygienist training, dentist training, and health-care centre) consolidation actions and tools were needed on different levels, in and between organizations, such as agreements, curricula, handbooks and timetables (Keto et al., 2010).

Many studies using DWR approach have been conducted in working life contexts (cf. the collection of different studies in Engeström, 2005). But there are few studies connected to comprehensive school or general upper secondary education. Kärkkäinen (1999) studied teachers' collaboration and teamwork in Finland and in the USA. Rainio (2003) analysed teachers' argumentation when talking about school change and development. Käyhkö (2015) examined partnership between school and local community focusing on entrepreneurship education. Rajala (2016) explored teachers' development focusing on transformative agency and agency-centred pedagogy.

However, my focus is on secondary and tertiary level professional and vocational education and studies implemented in this area in Finland. Even focusing on studies conducted in Finland, there are many to choose from; I have collected into table 1 an overview of the studies, and elaborate three of them specifically.

Table 1 shows the summary of the eight studies including study aims, main material collected in the study, method and concepts used in the study as well as main findings of the studies.

Table 1. Summary of the studies in the field of VET using DWR.

Author, year and type of study[1]	Aim	Main material and method	Main concepts	Main findings	What new was produced
Konkola 2002 LT[2]	To examine collaboration between education and working life	Tutorial discussions Documents Interventions	Developmental transfer Boundary zone Boundary object	Reorganizing traditional tutorial discussions into boundary-zone activity promoted developmental transfer	Boundary-zone activity as new activity for collaboration between working life and education
Hyrkkänen 2007 DD	To describe formation of a new R&D concept	Interviews Change laboratory intervention	Cognitive trails ASM[3] Expansive cycle	Concept of thesis work expanded and a new conceptual model was developed	Research arena – model
Ahokallio-Leppälä 2016 DD	To examine human resources development and its challenges	Documents Interviews Questionnaires Interventions	ASM Expansive learning Competence management	Trajectory of a longitudinal development work Tools for competence management	New competence management and development system
Tuomi-Gröhn 2003 O	To evaluate 3 developmental projects	Field-notes from observations, Audio recordings of meetings	Zone of proximal development Developmental transfer Boundary crossing	Collaborative team is important for a successful project Dialogue between theoretical knowledge and everyday experiences enhance development	New understanding of successful development projects: how the project is anchored into larger institutional setting
Lukkarinen 2005 LT	To examine collaboration between VET and working life in ambulance service	Tutorial discussion Interview	ASM Developmental Transfer Expansive learning	New tools for documentation Expansion of networks	Instructions for documentation New documentation rapport
Härkäpää 2005 LT	To analyse initiatives for co-operation	Workplace meetings	Trading zone Developmental transfer ASM Boundary crossing	Trading zone gives opportunity for developmental transfer but it requires skills of negotiation from all parties	Trading zone can promote change agency
Teräs 2007 DD	To analyse challenges of immigrant training	Discussion Intervention	ASM Interculturality	Culture laboratory offered a solid background for intercultural learning	Culture laboratory
Lambert 1999 DD	To analyse potentials of new activity model	Discussion Intervention	ASM Contradiction Perspective	Learning studio enabled boundary crossing and collaboration between educational institutions an working life	Learning studio

[1] DD=Doctoral dissertation, LT=Licentiate thesis, O=other, [2] Each publication's reference details are found in the references, [3] ASM=activity-system model.

The eight studies covered secondary and tertiary level VET and vocational teacher education. The impetus for the studies was change in the vocational/professional education system, organization or society. Especially important was co-operation between school and working life. Changes emphasized need for new types of competences for teachers and students. The aims of the studies were to examine and analyse development, produce new tools for practices, and conceptually and theoretically manage everyday practices. Most of the studies were either licentiate theses or doctoral dissertations; only one study by Tuomi-Gröhn (2003) was not. All of them were embedded within larger development and research projects. In most studies, the researcher had a dual-role as a teacher/researcher, and the study was conducted in the researcher's own workplace. Research materials were many and diverse; intervention was implemented in five of the studies. New tools, models or concepts were created and in some studies also tested. All studies produced new knowledge in form of concepts, tools, methods or models for vocational and professional education.

New conceptualization, interventions, and boundary crossing

I chose to look closer at three studies, because they presented three contexts of professional and vocational education. The impetus for Hyrkkänen's (2007) study arose when universities of applied sciences were formed during the 1990s in Finland. The task of research and development (R&D) was added to responsibilities of UASs. Hyrkkänen examined how this new task was perceived and how the concept of R&D, nowadays called research, development and innovation, emerged and was developed. The study was part of a larger research and development project. Here the societal change can be seen, forming a new school level, which affected practices of the school. Thus, she examined the concept-formation process for R&D activity in a university of applied sciences. She also analysed challenges and obstacles of the formation process. The researcher's role was to act as a researcher-interventionist in her organization. (Hyrkkänen, 2007)

From the DWR point of view the first phase was charting the present situation. Hyrkkänen (2007) interviewed 22 persons who were part of the school management to form understanding of how they perceived R&D work at the university of applied sciences. In the second phase, she analysed the historical phases of universities of applied sciences and the history of the concept of R&D within them. She described how the object of teachers' work expanded from teaching to include R&D work. She applied Cussins's theory of cognitive trails (1992), Toulmin's (1972) evolution of concepts, and Engeström's and his colleagues' (Engeström, Pasanen, Toiviainen & Haavisto, 2005) complex concepts

as well as theory of expansive learning (Engeström, 1987/2015). For example, she identified contradictions in teachers' work: if you focus on teaching, you neglect R& D, and if you focus on R&D you neglect teaching (Hyrkkänen, 2007, p. 31). In the third phase of the DWR process, supporting and planning the new model, in this case the new concept for R&D, she organized the change laboratory[2] intervention for the teachers of a social and health care program. During this phase, the teachers discussed and elaborated how the new concept would be put into practice. In the fourth phase, as the result of the new R&D concept, the teachers started to experiment with a new type of thesis work with the students. The teachers wanted to develop the thesis work from narrow, school-inside work to larger R&D projects together with working life. For the purposes of the new type of thesis work a 'research arena- model' was formed. The last DWR phase, spreading and consolidating the new concept, was outside the scope of the dissertation. Hyrkkänen's (2007) main results highlighted how the concept of thesis expanded from a narrow school-based thesis to an integrative work-life based thesis. DWR formed a solid methodology for her work offering methods and theoretical tools for analysing the developmental process. However, it remained open how sustainable this development work was.

In my dissertation work (Teräs, 2007) I developed an intervention method called a culture laboratory. It was based on a generic change laboratory methodology, in which vocational teachers and immigrant students together examined challenges of preparatory immigrant training. The study was embedded in a research and development project. The impetus for the work was the changing situation of immigration in Finland. More migrants moved to Finland and a new training called a preparatory training for immigrant students orienting toward VET started in the end of the 1990s. Thus, my research and development project focused on the new immigrant training and challenges encountered within the training, such as lack of materials and methods to teach second language speakers. The aim of the study was to examine challenges of the new immigrant training and to develop a method and a tool for evolvement of the training, in which all parties were present: immigrant students, teachers, and other personnel of the college. The culture laboratory intervention was conducted and it formed the main material for the study. My role was to act as a project researcher during the study in my workplace. Theoretical bases came from CHAT such as the concepts of culture and contradiction, and the activity-system model. The main findings were that the culture laboratory offered a solid background for intercultural learning and development. The study also recognized that intercultural space was a tension-rich area, and that the process of observing and comparing different cultural practices offered potential for creating something new. In other words, cultural practices of the previous and present school needed to be identified and reflected on to be able to start new practices.

From a DWR point of view my dissertation focused on the first and second phase of the DWR cycle: charting and analysing the present immigrants' training situation, and analysing contradictions between students' previous school practices and the current ones. The subsequent phases of the DWR cycle were not described in my dissertation.

The third study by Lambert (1999; 2003) focused on challenges of crossing boundaries between vocational teacher education, vocational schools, and workplaces. Also her study was embedded in a larger research and development project and an experimental programme based on an expansive learning cycle within vocational teacher education. The impetus for her development work was that the teacher students did a development project during their studies, but findings of the projects did not spread to their educational institutions or to working life. Lambert created a boundary-crossing space and invited participants from three parties to discuss about the current state of training. She called the space 'a learning studio', in which the participants were able to cross boundaries of their institutions and examine learning and expertise needed in their professions. The learning-studio intervention can also be regarded as a formative intervention for boundary-crossing purposes for those who were interested in development work. The main research material consisted of the meetings in the learning studio, all meetings were video recorded, and in addition interviews were made. The researcher acted in the role of a teacher educator/researcher. The main findings suggested that in the learning studio meetings, new solutions, concepts or models for collaboration were created by the participants. Thus, the learning studio enabled boundary crossing and collaboration between educational institutions, teacher education, and workplaces. The theoretical bases of the study came from CHAT and expansive learning such as the concepts of object, activity-system model, and zone of proximal development.

From the DWR point of view, she started her dissertation from the third and the fourth phase: the new model of 'the learning studio' had been formed and she wanted to experiment and analyse its uses and functions. The previous phases had been described in Lambert's licentiate thesis (1994), and the last phase of the DWR cycle was outside the scope of her dissertation.

Discussion

The aim of this article was to elaborate the DWR approach by examining different studies made in the field of professional and vocational education to reveal potentials and shortcomings of the approach and to identify future challenges. DWR has attracted co-operation between researchers and practitioners to develop practices in a scientifically way and has provided theoretical and methodological tools for research and development work. Impetus for studies were

changes in the Finnish VET system (e.g. Tuomi-Gröhn, 2003; Lukkarinen, 2005; Hyrkkänen, 2007) or in the Finnish society (e.g. Teräs, 2007). Thus, the researchers and the practitioners were the front liners of experiencing change and were looking for tools to map and manage these changes.

I identified three types of contributions to vocational and professional education. First, the DWR approach offered theoretical and methodological tools for understanding and managing change such as the activity-system model, theory of expansive learning, the concept of boundary crossing and formative intervention methodology. Second, with the help of DWR new understanding, knowledge and methods were produced such as the research-arena model, new concept of R&D, instructions for ambulance service, and the culture laboratory. Third, with the help of the DWR approach the researchers and the practitioners were able to be engaged in research and development work. Engeström (1998) wrote that typically DWR produces three types of results. First were those focusing on development of practices such as new tools; in this case, for example, Lukkarinen's (2005) study produced an instruction for documentation in an ambulance service. Second, new types of, what Engeström (1998) called, intermediate concepts are produced to help participants to understand and manage the activity in question in a qualitatively new way. In this case, for example, Konkola's (2002) boundary-zone activity for co-operation between working life and school within the occupational-therapist education. Co-operation between education and working life seems to be a recurrent and frequent topic of research even today in VET. The third type of contributions are those focusing on science; in this case, for example, the concept of developmental transfer by Tuomi-Gröhn (2003) and new intervention methods such as the learning studio by Lambert (1999).

However, I also found four types of shortcomings, which may cause setbacks. First, researchers' dual roles may be problematic. Being a researcher in one's workplace can give you access to knowledge that is not shared with outsiders, but this position can also make you blind to something that is visible to outsiders. This can cause ethical dilemmas, especially if the researcher is on managerial position in the organization. Second, in interventions, and especially in a change situation, participants typically want to develop and are keen to find new solutions. One can argue that any change is good and participants push towards solutions, and thus want to satisfy need of mapping and managing the change. Third, there are not many post-doctoral studies in the area of vocational and professional education using the DWR approach. Forth, studies did not fully cover the phases of the DWR cycle and as a result of this there are no evidence of how sustainable new tools, concepts or methods produced in the projects have been.

Table 2. Level and focus of DWR studies in the field of VET.

Level of development work	**Focus**	**Study**
Macro: society	VET systems	–
Meso: collective community	School, work place	All introduced
Micro: individual	Teacher, student	–

The DWR approach has been criticized by Langemayer and Roth (2006) that it focuses on the collective instead of the subjective. This tendency is visible also in the field of VET studies (see table 2). All studies introduced here focused on development of meso-level practices, in other words practices of VET in schools or practices developing co-operation between schools and work places. None of the studies focused on societal level, which is a tad paradoxical, because the impetus for many studies came from changes on the societal level (e.g. Hyrkkänen, 2007; Teräs, 2007). And none of them focused on individual development of a teacher or a student. However, one can argue that distinguishing different levels is artificial, and when a group of people is collaborating in development work, individual development occurs as well, and the agency of the researcher, or researcher-interventionist, is crucial to the research processes. For example, Virkkunen and Schaupp (2011) has presented a sophisticated learning path and role of an individual in-house developer in the development process. But the focus of the presented studies has been on practices of collective level.

Another critic against the DWR approach by Avis (2009) is that DWR is focussing on locally situated practices and their progressive potentialities and thus forgetting the wider societal context and relations within it such as socio-economic structures. To reflect this on the presented studies in the field of VET, I formed the following figure 2.

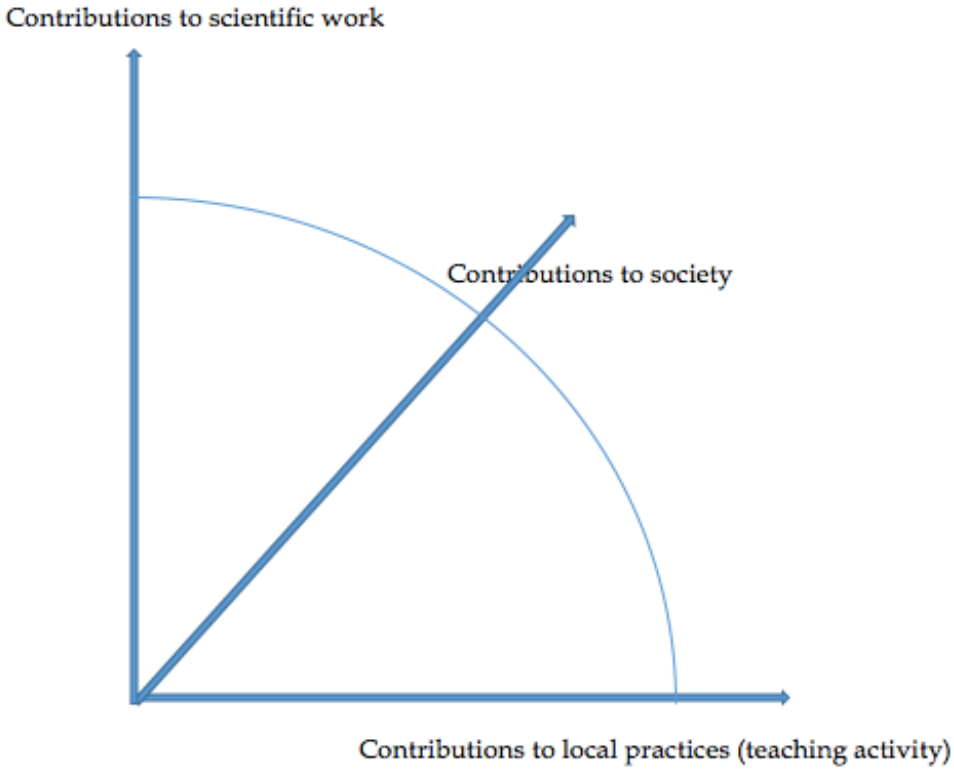

Figure 2. Contributions of the DWR approach in the field of VET.

In the horizontal axis, there are contributions to local practices, in this case mostly contributions to teaching activity such as new tools and spaces for collaboration between school and work (e.g. Härkäpää, 2005; Lukkarinen, 2005). The vertical axis describes contributions to scientific work such as the concept of developmental transfer (e.g. Tuomi-Gröhn, 2003). The diagonal axis describes contributions to the wider society. I placed this contribution horizon in the middle, even though, none of studies presented here explicitly made a direct contribution to a wider socio-economic or political level. However, one can argue that results of scientific work are also contributions to the society. They increase the knowledge base of the society and thus capabilities of all involved individuals of the society. This has a wider impact on quality of education and the competence level of people in the society. The arc in the figure 2 describes potentiality of the DWR approach, which takes into consideration and combines different areas of contributions in the field of VET. In other words, researchers using the DWR approach need to create concepts, tools and practices that highlight this multi-dimensionality of contributions. In conclusion, I state that the DWR approach offers rich and solid theoretical and methodological instruments for VET researchers to study and develop practices in the field. However,

researchers should not forget the individual nor societal contributions and dimensions of all research activity.

Endnotes

[1] See www.helsinki.fi/cradle for more information.
[2] Change Laboratory is a formative intervention method within DWR (for more information, see Virkkunen & Newnham, 2013).

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Marianne Teräs works as an associate professor at Stockholm University, Department of Education. Her research interests are in the areas of vocational and professional education and training, and learning in multicultural environments. She has studied challenges of technology-mediated learning and especially simulation-mediated learning in professional education of health care personnel.

In her doctoral dissertation she developed an intervention method called a culture laboratory for intercultural learning and immigrant education. Her first post-doctoral research focused on co-operation and new types of educational methods of dental and oral-hygienist students in patient care. Her second post-doctoral research project was part of the Finnish Academy funded OPCE-project (Opening Pathways to Competence and Employment for Immigrants), in which she explored critical school transitions of immigrant youth.

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