JYX JYVÄSKYLÄN YLIOPISTO UNIVERSITY OF JYVÄSKYLÄ

This is a self-archived version of an original article. This version may differ from the original in pagination and typographic details.

Author(s): Tynjälä, Päivi; Virolainen, Maarit; Heikkinen, Hannu L.T.; Virtanen, Anne

Title: Promoting Cooperation between Educational Institutions and Workplaces : Models of Integrative Pedagogy and Connectivity Revisited

Year: 2020

Version: Accepted version (Final draft)

Copyright: © 2020 Franz Steiner Verlag

Rights: In Copyright

Rights url: http://rightsstatements.org/page/InC/1.0/?language=en

Please cite the original version:

Tynjälä, P., Virolainen, M., Heikkinen, H. L., & Virtanen, A. (2020). Promoting Cooperation between Educational Institutions and Workplaces : Models of Integrative Pedagogy and Connectivity Revisited. In C. Aprea, V. Sappa, & R. Tenberg (Eds.), Konnektivität und lernortintegrierte Kompetenzentwicklung in der beruflichen Bildung / Connectivity and Integrative Competence Development in Vocational and Professional Education and Training (VET/PET) (pp. 19-40). Franz Steiner Verlag. Zeitschrift für Berufs- und Wirtschaftspädagogik : Beihefte (ZBW-B), 29.

PÄIVI TYNJÄLÄ / MAARIT VIROLAINEN / HANNU L. T. HEIKKINEN / ANNE VIRTANEN

Promoting Cooperation between Educational Institutions and Workplaces: Models of Integrative Pedagogy and Connectivity Revisited

Förderung der Kooperation zwischen Bildungseinrichtungen und Arbeitswelt: Modelle der integrativen Pädagogik und Konnektivität neu überdacht

KURZFASSUNG: Dieser theoretische Überblick befasst sich mit der Entwicklung und Anwendung des Integrativen Pädagogischen Modells sowie des Konnektivitäts-Modells zur Untersuchung der Organisation des Lernens an der Schnittstelle zwischen Bildungseinrichtungen und Arbeitswelt. Der Beitrag untersucht Aspekte, die beide Modelle hervorheben, und identifiziert Gemeinsamkeiten und Unterschiede zwischen ihnen. Einschlägige Studien zu diesen Ansätzen wurden zur diesem Zweck gesichtet und ausgewertet. Der Überblick zeigt, wie die integrative Pädagogik das Lernen des Einzelnen als Ausgangspunkt nimmt und wie Lehrpersonen die Lernenden unterstützen können, indem sie sie ermutigen, theoretisches Wissen, Erfahrung und Selbstregulierung beim Lernen zu kombinieren. Während dieses Modell der Pädagogik entstammt, hat der Connectivity-Ansatz seien Ursprung eher in der Soziologie und zeigt interpretative Veränderungen des Wissens im Prozess der Rekontextualisierung auf. Beide Ansätze betonen die Rolle der Praxisgemeinschaften beim Aufbau einer „Zone der proximalen Entwicklung“ und wurden zur Konzeptualisierung des Zusammenwirkens zwischen Bildungseinrichtungen und Arbeitsorganisationen angewandt.
Schlagworte:

ABSTRACT: This theoretical review reflects on the development and application of the Integrative Pedagogical model as well as the Connective model investigating the organisation of learning in the interface between educational institutions and workplaces. The article explores the aspects that these two models emphasise, and identifies similarities and differences between them. Key studies on these approaches were reviewed to accomplish the task. The review shows how integrative pedagogy takes the individual’s learning as its

starting point and how educators can support students by encouraging them to combine theoretical knowledge, experience and self-regulation in learning. While this model is pedagogical, the connectivity approach is more sociological in nature and highlights interpretative change concerning knowledge in the process of recontextualisation. Both approaches emphasise the role of communities of practice in building the zone of proximal development, and have been applied to conceptualise collaborative arrangements between educational institutions and work organisations.
Keywords: integrative pedagogy, connectivity, work and learning, student learning at work, theoretical models

1 Introduction: Research questions, aims, and theoretical background

Interest in the collaboration between educational institutions and the world of work has increased over the last few decades for two major reasons. Firstly, their reciprocal relations have been understood more and more as a prerequisite to modern innovation and the present knowledge economy (see, e.g., GIBBONS / LIMOGES / NOWOTNY / SCHWARTZMAN / SCOTT / TROW, 1994; UNESCO, 2005; VÄLIMAA / PAPATSIBA / HOFFMAN, 2016). Secondly, the expansion of higher education (HE) and emergent academic unemployment have increased the interest in promoting HE institutions' collaboration with the working world (SCHOMBURG / TEICHLER, 2006). This interest has not only been reflected in efforts to improve graduates' employability, but also in efforts to develop the matching of education with labour market demands in a more systematic way (EUROPEAN COMMISSION, 2016). Accordingly, there is a need to better understand how educational institutions can collaborate with the workplaces to improve education and keep it up to date to meet the changes and transformation taking place in the world of work and society as a whole.

In parallel, research on combining learning at school with learning from experience gained outside school has been expanding (e.g., DIEPSTRATEN / DU BOIS-REYMOND / VINKEN, 2006; CHISHOLM / DAVIS, 2007; HARRIS / CHISHOLM / BURNS, 2013). This article reviews, in particular, two research approaches in order to better understand the complexities of organising these collaborative efforts and to support the combination of learning from work experience and education. First, it reflects on the long-standing development of the Integrative Pedagogy model and the rise of theoretical approaches to investigate the relations between educational institutions and the working world (TYNJÄLÄ, 2009; JÄÄSKELÄ, NYKÄNEN, & TYNJÄLÄ, 2018). Secondly, it reflects on the use of the Connective Model in research for the

same purpose (GUILE & GRIFFITHS, 2001; GRIFFITHS & GUILE, 2003). Herein, we review, in particular, studies conducted at the Finnish Institute for Educational Research, University of Jyväskylä, Finland, where both model approaches have been utilised in research to understand how practices of educational institutions and enterprises have been intertwined to promote students' expansive learning.

As the two approaches to combining education and work are complementary and partly overlap, the aim of our study was to explore what aspects these two often cited models emphasise in what way in comparison to one another. In order to fulfil this goal, we reviewed and revisited key studies and publications related to developing integrative pedagogy and connectivity. We posed these research questions:

1) How has the model of integrative pedagogy developed through empirical studies and the adoption of novel viewpoints over the years, since the 1990s?
2) What kinds of shifts have there been with respect to the research discussion regarding the model of connectivity?
3) How do these two approaches to promote combining learning at educational institutions with that at workplaces differ in their emphasis?

Development of expertise through the Integrative Pedagogy approach

Progress of the Integrative Pedagogy model

The origins of Integrative Pedagogy can be traced back to research on expertise conducted in the 1990s (e.g., BEREITER & SCARDAMALIA, 1993; ETELÄPELTO, 1997; TYNJÄLÄ ET AL., 1997). However, the actual model of Integrative Pedagogy was only developed further after extensive research on the constructivist approach to learning in higher education and on work-based learning during vocational education training (VET) (e.g., TYNJÄLÄ, 1998; TYNJÄLÄ, 1999; TYNJÄLÄ & COLLIN, 2000; COLLIN & TYNJÄLÄ, 2003; TYNJÄLÄ & VIRTANEN, 2005; TYNJÄLÄ, 2007; VIRTANEN, TYNJÄLÄ, & COLLIN, 2009).

The Integrative Pedagogy model (IP model) is based on the analysis of expert knowledge (BEREITER, 2002; BEREITER & SCARDAMALIA, 1993; ERAUT, 2004; LE MAISTRE & PARE, 2006; TYNJÄLÄ, 2009), and, at the same time, it acknowledges the sociocultural perspective as a basis for understanding the situated nature of learning and expertise development (ERAUT, 2004; ILLERIS, 2004; LAVE & WENGER, 1991; WENGER, 1998). The basic tenet of the model is that *in high-level competence, the main elements of expertise are tightly integrated and fused.* These main elements are:

1) *Theoretical or conceptual knowledge,* which is universal and explicit in nature and can be learned, for example, by reading professional journals and books, by listening to expert presentations, and by sharing knowledge with peers, mentors and trainees in expert networks, including via digital media.
2) *Experiential or practical knowledge,* which is personalised through experiences. It is derived from particular cases, phenomena and occasions. While it may be implicit or tacit in nature, it can also be narrated, reflected upon and discussed.
3) *Regulative knowledge,* which involves professionals' command of their own mind and activities. It includes metacognition, that is, awareness and regulation of one's cognitive capacities. It also involves self-reflection, specifically: reflection-in-action, reflection-on-action, and reflection-for-action. As such, it incorporates following one's own actions' effects through work processes not only with respect to tools and artefacts but also regarding collaborators, clients and oneself.
4) *Sociocultural knowledge,* which materialises in social practices and through communication means, gives access to knowledge depositories, professional networks and hierarchies, as well as involving the tools and devices used in practices.

Sociocultural knowledge deviates from the first three mentioned types of knowledge. While conceptual, practical and regulative types of knowledge are personal, sociocultural knowledge is embedded in practices. For example, each workplace has certain written and/or unwritten rules and ways of doing things as well as shared devices and materials, and the only way to gain access to this kind of sociocultural knowledge is to participate in communities of practice of that workplace. For this reason, authentic experience and problem solving in the workplace are an important part of the development of vocational competence and professional expertise in the IP model.

Because of the integrated nature of expertise, the IP model emphasises that *educational practices should support the integration and fusion of the different forms of expert knowledge* (e.g., TYNJÄLÄ, 2008; TYNJÄLÄ, SLOTTE, NIEMINEN, LONKA, & OLKINUORA, 2006; ELVIRA, IMANTS, DANKBAAR, & SEGERS, 2017). For this purpose, various pedagogical methods can be used. For example, students can reflect on their work experience in the light of theoretical models or concepts in learning journals, logs and blogs or in discussions with peers, teachers and workplace trainers. Analytic writing tasks and collaborative assignments may also be used for the same purpose. The main idea is to apply and transform theoretical and conceptual knowledge into practical problem solving, explicate and conceptualise practical knowledge, and reflect on one's experiences by using conceptual tools. The cognitive activities involved

in these processes are integrative thinking (KALLIO, 2011) and problem solving (BEREITER & SCARDAMALIA, 1993; ELVIRA ET AL., 2017). The socio-personal account by BILLETT (2014) about the duality of what the workplace affords to students and how learners elect to engage in workplace learning is acknowledged in the model.

The theoretical model of Integrative Pedagogy was first presented to the international audience late in the first decade of the 2000s (TYNJÄLÄ ET AL., 2006; TYNJÄLÄ, 2008, 2009). Since then, it has been further tested empirically through implementation in several research projects (e.g., HEIKKINEN, TYNJÄLÄ, & KIVINIEMI, 2011; KORHONEN, HEIKKINEN, KIVINIEMI, & TYNJÄLÄ, 2017; TYNJÄLÄ, VIRTANEN, KLEMOLA, KOSTIAINEN, & RASKU-PUTTONEN, 2016). It has also been further refined, for example, to emphasise sociocultural context (TÄKS, TYNJÄLÄ, TODING, VENESAAR, & KUKEMALK, 2014) and to take into account the role of emotions in learning (ARPIAINEN, LACKÉUS, TÄKS, & TYNJÄLÄ, 2013; TYNJÄLÄ ET AL., 2016). It has also been applied in studies focusing on issues such as applying and designing technologies for workplace learning (TYNJÄLÄ, HÄKKINEN, & HÄMÄLÄINEN, 2014) and developing entrepreneurship education (TÄKS ET AL., 2014) as well as health care education (KOSKINEN & ÄIJÖ, 2013; ORTOLEVA & BÉTRANCOURT, 2016). In the following section, key findings of recent studies utilising this model are reviewed.

Applications and developments of the Integrative Pedagogy model

In this section, we illustrate, with the help of key examples, how the IP model has been applied and further developed in recent studies. The examples stem from various contexts, such as teacher education and teachers' professional development, engineering education, health care, different fields of VET, and e-learning at work.

In teacher education, the model has been applied in organising practica, that is, student teachers' learning from work experience. In a study by HEIKKINEN, TYNJÄLÄ AND KIVINIEMI (2011), the IP model was applied by integrating a practicum with a course in *Ethics and Philosopy in Education* to promote student teachers' professional autonomy. Writing a learning journal, composing a portfolio, as well as discussions with peers and a mentor were used to make connections between theoretical approaches to ethical action as a teacher and practical experience in teachers' work. Both student teachers and their supervisors reported that this pedagogical model provided them with a forum for reflective dialogue and collaboration. Student teachers also reported not only about the development of professional autonomy and knowledge, but also about a greater sense of community and their increased certainty regarding career choices. This can be seen as an indicator of strenghtening teacher

identity. Another study, conducted in the teacher education context by TYNJÄLÄ AND COLLEAGUES (2016), examined whether the IP model would work in circumstances where authentic work experience was missing and thus compensated with simulations of real-life experiences. In two courses on social competencies the theoretical literature was integrated with practical experiences by using a variety of group activities, simulations, role play, peer feedback, and reflective reading and writing. In addition to social skills, the students reported learning about domain-specific skills, academic skills, creativity, and the development of independence. Thus, both studies on teacher education suggest the feasibility of the model in teacher education.

The IP model has also been used in the development of the Finnish model of peer-group mentoring (PGM) (HEIKKINEN, JOKINEN, & TYNJÄLÄ, 2012). In this context, the model has served two purposes: first, it has been one of the main principles used in organising mentor training, and, second, it has been applied in actual peer-group mentoring activities. Both in mentor training and group-mentoring reflection in different forms, it has been used as a method to combine theoretical, practical, regulative and sociocultural knowledge. A study by GEERAERTS AND COLLEAGUES (2015) showed that its participants saw PGM as an important method for professional development throughout their teaching career. KORHONEN, HEIKKINEN, KIVINIEMI AND TYNJÄLÄ (2017) examined a more recent version of PGM, that is, *mixed* peer-mentoring groups of in-service and pre-service teachers. In that study, they focused on pre-service teachers' experiences. The results showed that the pre-service teachers' experiences of the mixed peer-mentoring groups were positive and highlighted the importance of having connections to the working world. However, their experiences varied from seeing the activity like a coffee break or as peer support to experiencing it as a forum for identity construction or even as a professional community. Every participant had experiences relating to more than one of these categories, but not all of them reached the last category describing the broadest and deepest experience. One of the aspects differentiating the four categories of experience is the relationship between theory and practice. While in the 'coffee break' experience, theory was seen separate from practice, in the last category, the relationship was integrative and critically reflective. The authors stress the role of the mentor in promoting the integration of different forms of knowledge, and suggest that, in further development of the model, the mentor training should provide mentors with more practical methods for supporting the true integration of theoretical and practical knowledge.

In the context of professional and vocational education and training, the IP model has been applied, for example, in health care and engineering education. KOSKINEN AND ÄIJÖ (2013)

examined how the IP model was executed during student placements in health care. They concluded that the model is a worthwhile learning framework, but that, in their research context, students should be supported more effectively in connecting theory and practice. This is exactly the same recommendation that KORHONEN AND COLLEAGUES (2017) presented in a study focusing on pre-service and in-service teachers' mixed peer-group mentoring.

In engineering education, the IP model has been used as the basis for organising an entrepreneurship course for students (TÄKS ET AL., 2014). In that particular study, all of the students found the course useful in terms of the acquisition of new knowledge, skills and self-awareness, though there was variance between the students in how they perceived the overall outcome. For some students, the course served as a first step to self-directed learning and as a preparation for work life, while some of the others experienced it as a path to possible self-employment and a context for developing leadership and responsibility for group achievement. Dealing with emotions proved to be pedagogically important when a learning environment requires more active input from students than they have been used to in their earlier studies. For this reason, the emotional dimension was added to the IP model (TYNJÄLÄ ET AL., 2016).

ORTOLEVA AND BÉTRANCOURT (2015) extended research on Integrative Pedagogy into the field of technology-enhanced learning by using a model for designing web-based collaborative writing and discussion tasks to support the integration of school and workplace learning in the education of social and health care assistants. They found significant gains in students' self-efficacy beliefs and performance in a case-based competence test for first-year students, but not for those in their second year. The students were also highly satisfied with the pedagogical arrangements, especially the collaborative learning. TYNJÄLÄ, HÄKKINEN AND HÄMÄLÄINEN (2014) have also examined the use of the IP model in the context of technology-enhanced learning at work, and they concluded that the model has the potential to serve both as a principle for designing technologies and for applying existing technologies in workplace learning.

Evidence of the feasibility and functionality of the IP model has also been provided by some studies that did not directly focus on the use of the model itself but on more general pedagogical features of student learning in VET and HE environments. For example, in a study on factors promoting vocational students' learning at work, it was found that the integration between school and workplace learning was the second most important factor explaining students' self-perceived learning outcomes at their workplace (VIRTANEN, TYNJÄLÄ, & ETELÄPELTO, 2014). In other words, the closer the integration between school

and workplace learning was, the better the students assessed their learning outcomes to be. More recently, a study in higher education contexts produced similar findings: A factor referred to as *Acting at the interface between theory and practice* was the strongest predictor of students' perceived learning of problem.solving skills in general and their ability to solve occupational problems in particular (VIRTANEN & TYNJÄLÄ, 2018).

In recent studies, the IP model has been used as a basis for creating principles for designing education for professional expertise development and for developing measurement tools for evaluating learning environments. ELVIRA, IMANTS, DANBAAR AND SEGERS (2017) conducted a literature review of studies on expertise development and used the IP model as an organising framework for creating ten instructional principles. These principles include the following recommendations for designing education: support students in their epistemological understanding, provide students with opportunities to differentiate between and among concepts, practise with a variety of problems to enable students to experience complexity and ambiguity, enable students to understand how particular concepts are connected, target relevance, share inexpressible knowledge, pay explicit attention to prior knowledge, support students in strengthening their problem-solving strategies, evoke reflection, and facilitate the development of meta-cognitive knowledge and skills. In another study, ELVIRA, BEAUSAERT, SEGERS, IMANTS AND DANKBAAR (2016) developed and validated an instrument to measure how these principles are supported in classroom settings. The study produced the following scales: *Sharing and comparing knowledge, Relevance, Self-control and self-reflection, Epistemological understanding, Teaching for understanding, Support learning for understanding,* and *Problem-solving strategies*. In our view, these scales seem to measure the presence of different forms of knowledge in learning situations quite well. However, the component of the true integration and fusion of the various forms of knowledge is less explicit. The scales seem to suit classroom settings well, whereas the assessment of learning environments involving the school–workplace connection requires further development. Furthermore, inclusion of the *emotional* dimension of learning would help to complete the instrument.

Identifying broader frameworks for organising education–work relationships

The Integrative Pedagogy model for deepening theory–practice relations in the development of expertise has also been adapted when examining frameworks for connections between education and work. In a recent study on how Finnish institutions of higher education have organised their pedagogical practices and workplace relations to support the development of

generic skills, four main models were identified (JÄÄSKELÄ, NYKÄNEN, & TYNJÄLÄ, 2018). In the *Specialist model*, the workplace relations are in the hands of specialists, and generic skills are taught in separate courses. The *Science-Based Renewal model* emphasises HE having a specific role as a creator of new knowledge, and generic skills and other competencies defined by stakeholders in business life are regarded critically. The *Project-Based Integrative model* highlights the close integration of theory and practice in education. This integration typically appears in interactive and project-based courses, and this model can be seen as following the IP model. The IP model is also present as a pedagogical principle in the fourth model, but this model, the *Model of Networked Culture*, goes even further. It is based on close connections between educational institutions and the world of work, where these have shared values and confidence in each other and are committed to developmental work in their professional field. In the model of Networked Culture, workplace learning and the development of students' work life skills are an integral part of curricula and embedded in educational structures. The management of workplace relations combines research, development and innovation activities with teaching and learning. The workplace relations are intentional, built strategically and also involve HE leaders in continuous, reflective learning processes. Leaders' promotion of networked culture supports networks that are understood to form the basis for education.
The four models of pedagogic practices and collaborative relations between the working world and educational institutions are depicted as generalised, ideal types; these are, however, seldom practised purely as such. Thus, in practice, all dimensions of any pedagogic practice are most probably not fully consistent with a particular idealised model. The aim of the models is to describe a variety of approaches and show how much emphasis each one places on promoting generic skills and workplace relations. The classification of the models can be used by HE institutions as an analytic tool in their collaboration with the working world and to reflect on their own approach. The models enhance HE institutions' strategic discussion and goal setting, and several models could be used, for example, by different faculties of one HE institution. Even though the models describe the various (historic) approaches of Finnish HE systems, they could be further tested and reflected upon in other European countries. New research would enable refining the models further and understanding the extent to which models for HE institutions' collaboration with the working world are transferable across cultures and national education settings.

The Connective Model as a basis for organising education–work relationships

The connective model is another approach that has been used in several Finnish studies in regard to relations between educational institutions and the working world (e.g., VIROLAINEN, 2004; 2007; VIRTANEN & TYNJÄLÄ, 2008; TYNJÄLÄ, 2009). The Connective Model became familiar to Finnish researchers and pracititioners, on a larger scale, when the findings of a certain EU project were presented in Helsinki, in 2001: *Work experience as an education and training strategy: New approaches for the 21st century* (GRIFFITHS ET AL., 2001). The project explored models for the adoption of learning through work experience in the curriculum for 16–19-year-olds in the United Kingdom, Ireland, Sweden, Spain, Denmark and Hungary. The project introduced all together five models for organising learning from work experience as part of a curriculum, namely, the: *Traditional model, Experiential model, Generic model, Work Process model,* and *Connective model*. While the first four models were based on practical examples derived from upper secondary education in the participating countries, the Connective model was constructed as an ideal model to surpass the shortages of the other four models.

The Connective model is based in three traditions of research in particular, specifically, the: sociocultural tradition, adult education, and curriculum theory. The term 'connective' is rather a metaphor, which refers to attempts to "provide the basis for a productive and useful relationship between formal and informal learning" (GUILE & GRIFFITHS, 2001, p. 113). The Connective model underlines the multiplicity of the contexts of learning alongside the traditional school learning, and the importance of informal learning alongside formally organised learning. From the perspective of curriculum theory, the connective model has adopted a differentiation between horizontal and vertical development (BERNSTEIN, 1999). While vertical development refers to individuals' cognitive progress through a hierarchy of knowledge and skills toward higher levels of abstraction, the horizontal development is about individuals learning particular knowledge through experience and moves from one context to another. Accordingly, horizontal development concerns individuals' sense of identity and their capacity to utilise mediating concepts to cope with the demands of varying organisational settings and work roles. Vertical development, in contrast, mostly takes place in formal education and is planned to progress step by step according to curricula and within frames of discipline-based knowledge. The sociocultural tradition's contributions to the Connective model are, in particular, the notions of situated learning (LAVE & WENGER, 1991) and communities of practice (WENGER, 1998), as well as the importance of guidance for development in the zone of proximal development (VYGOTSKY, 1982). In the zone of

proximal development, those with more experience can challenge novices to develop further by setting higher goals, demanding for learners to expand their present competences. Furthermore, analysis of the meaning of boundary crossing in work-based learning, rooted in the tradition of activity theory, has helped to give attention to efforts demanded by individuals to make social practices explicit and to develop new kinds of perspectives when moving from one context to another (ENGESTRÖM, 2001; ENGESTRÖM, Y., ENGESTRÖM, R., & KÄRKKÄINEN, 1995; TUOMI-GRÖHN & ENGESTRÖM, 2003). In interprofessional teams, the ability to understand perspectives across disciplinary contexts is demanded in particular (GUILE, 2011a). All in all, the connective model emphasises the connection making between formal and informal learning, school learning and workplace learning, and horizontal and vertical development.

The five models of work experience introduced in the original EU project differ in five ways in particular, namely in regard to: (i) what purpose work experience has for the programme, (ii) what kind of assumptions about learning and development the models represent, (iii) what work experience might involve in practice, (iv) what the role of the education and training provider is, and (v) what the expected outcomes of the work experience are (GRIFFITHS ET AL., 2001; GRIFFITHS & GUILE, 2003; GUILE & GRIFFITHS, 2001). In contrast to the Connective model, the four other models describe features of educational programmes that have been applied in various countries at different points of their economic and technological development. However, they are analytical rather than descriptive. In the following section, their approaches to learning from work experience as part of an educational programme are briefly characterised.

(i) The *Traditional model* considers learning from work experience as a rather simple matter of sending students to the world of work (GRIFFITHS ET AL., 2001). At work, students adapt to work tasks and assimilate new information. Wider collaborative efforts between an educational institution and a workplace are not demanded by this model.

(ii) The *Experiential model* of learning draws on Kolb's ideas of the experiential learning cycle and emphasises students' interpersonal and social development as well as reflection on action (see also GRIFFITHS & GUILE, 2003; GUILE & GRIFFITHS, 2001; KOLB, 1984). It gives priority to learning through practical applications within education, such as business partnerships, and enabling students to adjust to changes in the labour market.

(iii) The *Generic model* emphasises learner autonomy and learner-centred organisation of learning. Its practical examples include learning through work experience as adopted in the United Kingdom's vocational education and training (VET) as organised via national

vocational qualification (NVQ) programmes for students aged 16–19 years. These programmes, however, were replaced in 2015. They relied on a learning outcomes approach that reassigned the relation between assessment and prescribing forms of learning from schools to students and third parties (i.e., awarding bodies; see WOLF, 2011). In the generic model, learning through work experience has been enhanced by students designing a personal learning plan for work experience placement. Both the planning and process of learning are verified by evidence, such as portfolios that teachers have assisted with (see also GRIFFITHS & GUILE, 2003; GUILE & GRIFFITHS, 2001; RAGGATT & WILLIAMS, 1999; WHEELAHAN, 2009; WOLF, 1995).

(iv) The *Work Process model* has its roots in the German dual system and its VET tradition. It has introduced the need to develop the formal elements of study programmes as well as the work experience that is part of it, giving emphasis to assisting students in tasks and activities and recognising expected behaviour in work contexts. The work process model has highlighted the meaning of understanding individual tasks in the broader context of the production process. It has been criticised for the emphasis it places on students adjusting themselves to meet the requirements of the workplace instead of giving priority to critical, innovative thinking (see also BOREHAM, SAMURCAY, & FISCHER, 2002; FISCHER, BOREHAM, & NYHAN, 2004).

Recontextualising knowledge and interprofessional activities across boundaries

As mentioned above, the Connective approach has its origin in part in curriculum research. Its specific emphasis on knowledge as but one constituent of a curriculum has promoted deeper understanding of how many kinds of knowledge and competences are connected when learners move from one context to another, that is, from school to a workplace and to various interprofessional communities (BERNSTEIN, 1999; YOUNG, 2008; GUILE & GRIFFITHS, 2003) The task of making explicit what learners, teachers and interprofessional teams are actually engaged with when they are involved in boundary-crossing activities whilst moving from one context to another applying their competencies has remained in the focus of research. Several studies and frameworks have been conducive to understanding different sides of the multi-faceted phenomenon, such as knowledge work, boundary crossing and the formation of collaborative knowledge transferring across interprofessional groups. In the following section, the perspective of recontextualisation based on the connective approach is revisited in more detail.

EVANS, GUILE, HARRIS AND ALAN (2010) explored experiences from developing education in banking, aircraft engineering, media practice, financial services and management (see also GUILE, 2011b). In their article (2010), they discussed findings from these fields as to how the subject-based and work-based aspects of certain curricula could be better intertwined with one another in order to further develop nurse education programmes. In order to improve education planning, they suggested making explicit the different forms of knowledge recontextualisation that take place in a series, forming a chain of recontextualisation (CoR), when theory and practice are related in an educational programme. The four types of recontextualisation of knowledge that they consider to be particularly important when aiming to apply knowledge to practice are: content, pedagogy, the workplace, and learner recontextualisation. Each form of recontextualisation involves deliberate interpretation, choice and decision making with respect to knowledge usage. First, knowledge is chosen for the specific part of an educational programme (content recontextualisation, CR) by teachers and education planners. At times, also a higher administrative level or interest groups may participate in CR when a national basis for a curriculum is defined (for safety reasons, for example). Second, a type of pedagogy is chosen and practised to facilitate the adoption of learning content (pedagogic recontextualisation). Third, learnt knowledge is utilised in a workplace context in a conscious manner and reflected upon—in, on and for better action (workplace recontextualisation). The reflection itself may be supported by pedagogic practices, such as support and tools for reflection and guidance. Fourth, learners are active participants in this process and are ultimately the end users who intepret, learn, combine and reconstruct knowledge, as well as re-interprete their former knowledge and experiences (learner recontextualisation). This framework of four forms of recontextualisation has also been adopted in a study on adult education in Canada and the UK (TAYLOR, EVANS, & PINSENT-JOHNSON, 2010). The findings indicate that the framework helps to more accurately understand the oversimplified view of knowledge as a simple applicative transfer taking place when learners move from one learning environment and context to another, such as from school to a workplace and apply their competences (TAYLOR ET AL., 2010).

At the Finnish Institute for Educational Research (FIER), the Connective approach has been used to study work placements at universities of applied sciences (UAS) (VIROLAINEN, 2014). The Connective approach and its redefinitions have helped in recognising further developmental challenges in combining work-based learning through work placements. These challenges included features such as the need to enhance cooperation with employers, introduce more collaborative platforms, and develop quality assurance methods for

employers, besides work collaboration and finding employer profile-oriented cooperation options.

Currently, the FIER research team is participating in two Finnish national projects involving several universities of applied sciences, funded by the Finnish Ministry of Education and Culture. The projects aim to develop pedagogies for digital learning (i.e., the so-called 'eAMK' project; JYVÄSKYLÄN AMMATTIKORKEAKOULU, 2017) and learning from work experience, as well as developing the accreditation of prior learning (i.e., the so-called 'Toteemi' project; HAAGA-HELIA AMMATTIKORKEAKOULU, 2017) through networking, collaboration and the exchange of experiences and best practices. In order to help the developmental work of these networks, the researchers continue reviewing research on the subjects of combining varying contexts and environments of learning (e.g. combining e-learning and learning from work experience with school learning), and on the subject of developmental work in interprofessional teams involving learners, teachers and employers. This multi-faceted area of research allows for several points of departure, both theoretically and empirically. While the studies above provide a solid starting point, the research will be organised into sub-studies focusing on different elements of the processes where combining theory and practice are planned and developed. As several foci are possible, the experience gained from earlier research helps to demarcate the research. In addition to the IP and connective models presented and discussed above, further studies on boundary crossing and ecologies for practices suggest interesting starting points. For example, a review article by AKKERMAN AND BAKKER (2011) presented an overview of the dialogical mechanisms that are characteristic for processes of boundary crossing involving professionals of different fields. On the other hand, the ecologies of practices approach has been used in research particularly to deepen the perspective on teacher education, that is, to conceptualise leadership and professional development demanded by teachers when they are involved in developing practices (KEMMIS, EDWARDS-GROVES, WILKINSON, & HARDY, 2012).

Ecosystems of learning as a framework for connective practices

In both of the aforementioned ongoing projects, eAMK and Toteemi, the theoretical perspective of *ecosystems of learning* is being applied. This research perspective on learning at and for work is rooted in the metaphor of 'ecosystems', representing networks of educational institutions, companies, organisations and individuals acting in the world of work and education. Within this metaphor of ecosystems of learning, the world of work and the processes of learning are studied as a network of *living entities* interrelating with one another

like different species. The theory of ecosystems of learning explores how practices of learning and work are ecologically connected with one another and with other kinds of practices and organisations. From this perspective, social practices such as learning at work may be understood as living systems that co-exist interdependently with each other and other living organisms. One could say that different practices of learning at work form an ecosystem—a community of living organisms interacting as a system. Sometimes institutions or practices, like species of an ecosystem, can be regarded as competitors fighting against each other and competing for resources, and at other times or in other cases they collaborate with other species, so to speak, even forming a symbiosis.

Within an ecosystem of learning, organisations and individuals interact, collaborate and exchange experiences. The framework of ecosystems of learning draws our attention to the interdependence among particular clusters of practices, and the ways particular practices interact and influence each other in that one practice produces outcomes or products that are taken up by other practices. As such, we can regard practices as systems within a hierarchy of systems (KEMMIS & HEIKKINEN, 2012).

In the contemporary world of work and production, the processes of learning are brought right to the heart of the work processes. Cognitive functions and diverse generic skills have become the most valuable factors of production and economy. One could say that the driving force of the economy and production is the human brain. Nowadays, human knowledge is also continuously processed by portable devices. In this way, opportunities for online learning are commonly utilised in the ecosystem of learning.

The ubiquitous technology provides opportunities for learning, but it can also be regarded as a threat to human well-being. This is why the role of technological applications must also be examined critically. People carry smartphones and other portable information devices, and these devices integrate with their mental and cognitive processes. Information devices start to directly guide people's movements and actions. These devices are used both in workplaces and during leisure time. Hence, for a knowledge worker, leisure and working time are not always easy to separate from each other. Consequently, cognitive work is ever present in many people's life. As such, the daily work of such individuals is technically with them everywhere. Hence, this situation could be colloquially referred to as *anyplace working*; and because cognitive work is essentially a form of learning, such learning can be seen as *anyplace learning*. One might say we are not just becoming cyborgs, no, we are *already* cyborgs by definition; that is, persons 'whose physiological functioning is aided by or

dependent upon a mechanical or electronic device' (URSYN, 2013). This is why information devices are an essential element of the concept of ecosystems of learning and research on it. Anyplace learning refers to the fact that the border between formal and informal learning has blurred. In many jobs nowadays, an active and constant information retrieval is essential. Social media has also changed the forms of learning and contributed to the blurring of boundaries between formal and informal learning. This trend of informality within formal learning can be conceptualised as the *informalisation* of learning, that is, as a move toward more informal learning in formal settings. The line between formal and informal learning is also being blurred from the opposite direction. Parallel to the informalisation of formal learning, the *formalisation* of informal learning is being examined and discussed. This means that informal learning is increasingly acknowledged within formal settings such as schools and universities. This discussion is related to the notion of the *recognition of prior learning*, which has been promoted especially in the vocational education sector in Europe. Students are offered opportunities to demonstrate and build on what they have already learned in their work and everyday lives (HEIKKINEN ET AL., 2012; HEIKKINEN, 2018).

In the eAMK and Toteemi projects, the ecosystems of learning are being studied using FRITJOF CAPRA'S principles of ecology (CAPRA, 2004; 2005). CAPRA has listed eight principles of ecology that can be applied to any practice, including educational practices. These eight principles are: *Networks, Nested systems, Interdependence, Diversity, Cycles, Energy flows, Development,* and *Dynamic balance*. KEMMIS AND HEIKKINEN (2012) have added a ninth principle of ecology to the list, that of *Ecological niches*. We intend to show how (a) practices, by analogy with species, and (b) ecologies of practices, by analogy with ecosystems, meet the criteria implied by these nine principles of ecology. In the eAMK and Toteemi projects, the framework approach of ecosystems of learning is utilised to bring up and discuss how practices related to learning at and for work behave in accordance with these principles.

Conclusions: Toward connectivity between education providers and workplaces

In this article, we have examined two theoretical models regarding vocational and professional learning and the organising of the relationships between education and work; specifically, the Integrative Pedagogy model and the Connective model. Both similarities and differences can be identified between the two models. The questions that directed the

emergence and development of these two independently constructed models differed. The fundamental question of the IP model has been ‘how to support the development of vocational or professional expertise in students’, whereas the Connective model asks ‘how work experience either is being or could be organised in education’. The theoretical roots for seeking answers to these questions partly differ and are partly similar. While the Connective model relies on curriculum and adult education theory and sociocultural tradition, the IP model is based on studies concerning expertise and the socio-constructivist view of learning. Both of the models have been influenced by the sociocultural approach.

We view the two models as complementary to each other. Integrative pedagogy considers, as its starting point, the individual’s learning and how teachers and workplace trainers can promote it by providing support for integrating and fusing theoretical knowledge, experience and self-regulation in learning. The Connectivity approach, especially in its original form, focuses more on the institutional level and on organising collaborative practices between education providers and workplaces. Its later developments call attention to the transformation of knowledge in the process of knowledge recontextualisation through its four forms (Evans et al., 2010). Both models and their applications have emphasised the role of communities of practice (adopted from LAVE & WENGER, 1991, AND WENGER, 1998) in building the zone of proximal development that challenges students and guidance in building partnerships between education providers and the working world.

While the IP model has its roots in research on professional expertise and constructivist pedagogy, the Connective model reflects on the shortcomings of existing collaborative practices between education providers and the working world. Basically, the IP model can be seen as pedagogical, whereas the connective model seems to be more sociological in nature and concerned about education providers as ‘pre-definers’ of collaborative practices with workplaces. However, over the course of their development, the models have become closer to each other. Since the later redefinitions of the Connective approach, particularly concerning the four forms of knowledge recontextualisation (TAYLOR ET AL., 2010), the focus is more on choice making with respect to knowledge and its reinterpretation by learners, teachers and workplace supervisors. In its current form, the IP model emphasises, more than before, the role of the sociocultural environment in professional development (e.g., TÄKS ET AL., 2014; TYNJÄLÄ ET AL., 2016).

What is common to the two models is the strong emphasis of the need to provide students with authentic work experience, and to support their connecting this experience with what is being learned at school or university with the help of guidance to reflect in, on and for action.

Thus, both models stress the unity of theory and practice and the connection-making between formal and informal learning. For this purpose, pedagogical tools and practices are needed, and the pedagogical competence of teachers and workplace trainers gains in importance. An analysis by JÄÄSKELÄ AND COLLEAGUES (2018) also showed that, in order to ensure that the aims of these models become true, it is important to develop what the authors call the Model of Networked Culture model, in which the integrative and connective approaches are embedded in curricula and in active networks between education providers and the world of work. The area of educational leadership in the context of promoting work-based learning and support for combining theory and practice organisationally seems to demand, in particular, further theoretical and empirical research. For this purpose, the concept of ecosystems of learning provides a promising framework.

References

AKKERMAN, S. F. / BAKKER, A. (2011). Boundary crossing and boundary objects. *Review of Educational Research, 81*(2), 132–169.

ARPIAINEN, R.-L. / LACKÉUS, M. / TÄKS, M. / TYNJÄLÄ, P. (2013). The sources and dynamics of emotions in entrepreneurship education learning processes. *TRAMES Journal of the Humanities and Social Sciences, 17*(4), 331–347.

BEREITER, C. (2002). *Education and mind in the knowledge age.* Mahwah, NJ: Erlbaum.

BEREITER, C. / SCARDAMALIA, M. (1993). *Surpassing ourselves: An inquiry into the nature of expertise.* Chicago: Open Court.

BERNSTEIN, B. (1999). Vertical and Horizontal Discourse: An Essay. *British Journal of Sociology of Education, 20*(2), 157–173.

BOREHAM, N. / SAMURCAY, R. / FISCHER, M. (Eds.) (2002). *Work process knowledge*. London: Routledge.

CAPRA, F. (2005). Speaking nature's language: Principles for sustainability. In M. K. STONE / Z. BARLOW (Eds.), *Ecological literacy: Educating our children for a sustainable world* (pp. 18–29). San Fransisco: Sierra Club Books.

CAPRA. F. (2004). *The hidden connections: A science for sustainable living*. New York: Anchor.

CHISHOLM, C. / DAVIS, M. (2007). Analysis and evaluation of factors relating to accrediting 100% of prior experiential learning in UK work-based awards. *Assessment & Evaluation in Higher Education*, 32(1), 45–59.

COLLIN, K., / TYNJÄLÄ, P. (2003). Integrating theory and practice?: Employees' and students' experiences of learning at work. *Journal of Workplace Learning, 15*(7–8), 338–344.

DIEPSTRATEN, I. / DU BOIS-REYMOND, M. / VINKEN, H. (2006). Trendsetting Learning Biographies: Concepts of Navigating through Late-Modern Life and Learning. *Journal of Youth Studies, 9*(2), 175–193.

ELVIRA, Q. / BEAUSAERT, S. / SEGERS, M., IMANTS, J., DANKBAAR, B. (2016). Development and Validation of a Supportive Learning Environment for Expertise Development Questionnaire (SLEED-Q). *Learning Environments Research, 19*(1), 17–41.

ELVIRA, Q., IMANTS, J., DANKBAAR, B. / SEGERS, M. (2017). Designing Education for Professional Expertise Development. *Scandinavian Journal of Educational Research, 61*(2), 187–204.

ENGESTRÖM, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work, 14*(1), 133–156.

ENGESTRÖM, Y. / ENGESTRÖM, R / & KÄRKKÄINEN, M. (1995). Polycontextuality and boundary crossing in expert cognition: Learning and problem solving in complex work activities. *Learning and Instruction, 5*(4), 319–336.

ERAUT, M. (2004). Informal learning in the workplace. *Studies in Continuing Education, 26*(2), 247–273.

ETELÄPELTO, A. (1997). Asiantuntijuuden muuttuvat määritykset. In J. KIRJONEN / P. REMES / A. ETELÄPELTO (Eds.), *Muuttuva asiantuntijuus* (pp. 86–102). Jyväskylä: University of Jyväskylä, Institute for Educational Research.

EUROPEAN COMMISSION (2016). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions: *A new skills agenda for Europe: Working together to strengthen human capital, employability and competitiveness*. Accessed 10 November 2017: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016DC0941&from=EN

EVANS, K. / GUILE, D. / HARRIS, J. / ALLAN, H. (2010). Putting knowledge to work: A new approach. *Nurse Education Today 30*(3), 245–251.

FISCHER, M. / BOREHAM, N. / NYHAN, B. (2004). *European perspectives on learning at work: The acquisition of work process knowledge.* Luxembourg: Office for Official Publications of the European Communities.

GEERAERTS, K./ TYNJÄLÄ, P. / HEIKINEN, H. L. T./ MARKKANEN, I./ PENNANEN, M., / GIJBELS, D. (2015), Peer-group mentoring as a tool for teacher development.

European Journal of Teacher Education, 38 (3), 358-377. doi:10.1080/02619768.2014.983068

GIBBONS, M. / LIMOGES, C. / NOWOTNY, H. / SCHWARTZMAN, S. / SCOTT, P., / TROW, M. (1994). *The new production of knowledge: The dynamics of science and research in contemporary societies.* London: SAGE.

GRIFFITHS, T. / GUILE, D. (2003). A connective model of learning: The implications for work process knowledge. *European Educational Research Journal, 2*(1), 56–73.

GRIFFITHS, T. / GUILE, D. / MADSÉN, T. / WALLENTIN, C. / MCKENNA, P. / Ò'MAOLMHUIRE, . . . GORGENYI, I. (2001). *Work experience as an education and training strategy: New approaches for the 21st century*. Final report of an EU *fourth framework* project to the European Commission.

GUILE, D. (2011a). Interprofessional Activity in the 'Space of Reasons': Thinking, Communicating and Acting. *Vocations and Learning, 4*(2), 93–111.

GUILE, D. (2011b). Apprenticeship as a model of vocational 'formation' and 'reformation': The use of Foundation Degrees in the aircraft engineering industry. *Journal of Vocational Education & Training, 63*(3), 451–464.

GUILE, D. / GRIFFITHS, T. (2001). Learning through work experience. *Journal of Education and Work, 14*(1), 113–131.

HAAGA-HELIA (2017). *Toteemi-hanke tutkii ja kehittää käytännönläheisiä malleja työn ja korkeakouluopintojen yhdistämiseen*. Accessed 13 November 2017: http://www.amktoteemi.fi/en

HARRIS, M. / CHISHOLM, C. / BURNS, G. (2013). Using the Knowledge Transfer Partnership approach in undergraduate education- and practice-based training to encourage employer engagement. *Education + Training, 55*(2), 174–190.

HEIKKINEN, H. (2018). Research for practice, research about practices and research as praxis. In P. GROOTENBOER / C. EDWARDS-GROVES / J. (Eds.), *Wilkinson Education in an era of schooling: Critical perspectives of educational practice and action research*. Singapore: Springer.

HEIKKINEN, H. L. T. / JOKINEN, H. / TYNJÄLÄ, P. (2012). Teacher education and development as lifelong and widelife learning. In H. HEIKKINEN / H. JOKINEN / P. TYNJÄLÄ (Eds.), *Peer-group mentoring for teacher development* (pp. 3–30). London: Routledge.

HEIKKINEN, H. / TYNJÄLÄ, P. / KIVINIEMI, U. (2011). Integrative pedagogy in practicum: Meeting the second-order paradox in teacher education. In M. MATTSSON / T. V.

EILERTSEN / D. RORRISON (Eds.), *A Practicum Turn in Teacher Education* (pp. 91–112). Rotterdam: Sense Publishers.

ILLERIS, K. (2004). A model for learning in working life. *Journal of Workplace Learning, 16*(8), 431–441.

JÄÄSKELÄ, P. / NYKÄNEN, S. / TYNJÄLÄ, P. (2018). Models for the development of generic skills in Finnish higher education. *Journal of Further and Higher Education, 42*(1), 130–142.

JYVÄSKYLÄN AMMATTIKORKEAKOULU (2017). *Ammattikorkeakoulut rakentavat yhteistä digitaalista ja ympärivuotista opintotarjontaa.* Accessed 13 November 2017: http://www.eamk.fi/fi/etusivu/

KALLIO, E. (2011). Integrative thinking is the key: An evaluation of current research into the development of thinking in adults. *Theory & Psychology, 21*(6), 785–801.

KEMMIS, S. / HEIKKINEN, H. (2012). Future perspectives: Peer-Group Mentoring and international practices for teacher development. In H. HEIKKINEN / H. JOKINEN / P. TYNJÄLÄ (Eds.), *Peer-Group Mentoring for Teacher Development* (pp. 144–170). Milton Park: Routledge.

KEMMIS, S. / EDWARDS-GROVES / WILKINSON, J. / HARDY, I. (2012). Ecologies of practices. In P. HAGER, A. LEE, & A. REICH. (Eds.*), Practice, Learning and Change: Practice–Theory Perspectives on Professional Learning* (pp. 33–49). Dordrecht: Springer.

KOLB, D. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.

KORHONEN, H. / HEIKKINEN, H. /KIVINIEMI, U. / TYNJÄLÄ, P. (2017). Student teachers' experiences of participating in mixed peer mentoring groups of in-service and pre-service teachers in Finland. *Teaching and Teacher Education, 61*, 153–163.

KOSKINEN, L., / ÄIJÖ, M. (2013). Development of an integrative practice placement model for students in health care. *Nurse Education in Practice, 13*(5), 442–448.

LAVE, J. / WENGER, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press.

LE MAISTRE, C. / PARÉ, A. (2006). A typology of knowledge demonstrated by beginning professionals. In P. TYNJÄLÄ / J. VÄLIMAA / G. BOULTON-LEWIS (Eds.), *Higher education and work: Collaborations, confrontations and challenges* (pp. 103–113). Amsterdam: Elsevier.

ORTOLEVA, G. / BÉTRANCOURT, M. (2016). Supporting productive collaboration in a computer-supported instructional activity: Peer-feedback on critical incidents in health care education. *Journal of Vocational Education & Training, 68*(2), 178–197.

RAGGATT, P. / WILLIAMS, S. (1999). *Government, markets and vocational qualifications: An anatomy of policy*. London: Falmer Press.

SCHOMBURG, H. / TEICHLER, U. (2006). *Higher Education and Graduate Employment in Europe: Results from Graduate Surveys from Twelve Countries*. Springer.

TÄKS, M. / TYNJÄLÄ P. / TODING, M. / VENESAAR, U. / KUKEMELK, H. (2014). Engineering students' experiences of studying entrepreneurship. *Journal of Engineering Education, 103*(4), 573–598.

TAYLOR, M. / EVANS, K. / PINSENT-JOHNSON, C. (2010). Work-based learning in Canada and the United Kingdom: A framework for understanding knowledge transfer for workers with low skills and higher skills. *Research in Post-Compulsory Education 15*(4), 347–361.

TUOMI-GRÖHN, T. / ENGESTRÖM, Y. (2003). Conceptualizing transfer: From standard notions to developmental perspectives. In T. TUOMI-GRÖHN / Y. ENGESTRÖM (Eds.), *Between school and work: New perspectives on transfer and boundary-crossing* (pp. 19–38). Amsterdam: Pergamon.

TYNJÄLÄ, P. (1998). Writing and conceptual change in university studies. In M. F. CRÉTÉ / E. ESPÉRET (Eds.), *Writing and learning to write at the dawn of the 21st Century: Proceedings* (pp. 17–24). LaCo-CNRS. Maison des Sciences de l'Homme et de la Société, Université de Poitiers.

TYNJÄLÄ, P. (1999). Konstruktivistinen oppimiskäsitys ja asiantuntijuuden edellytysten rakentaminen koulutuksessa. In A. ETELÄPELTO / P. TYNJÄLÄ (Eds.), *Oppiminen ja asiantuntijuus*. Työelämän ja koulutuksen näkökulmia (pp. 160–179). Helsinki: WSOY.

TYNJÄLÄ, P. (2007). Integratiivinen pedagogiikka osaamisen kehittämisessä. In H. KOTILA, A. MUTANEN / M. V. VOLANEN (Eds.), *Taidon tieto* (pp. 11–36). Helsinki: Edita.

TYNJÄLÄ, P. (2008). Perspectives into learning at the workplace. *Educational Research Review, 3*, 130–154.

TYNJÄLÄ, P. (2009). Connectivity and transformation in work-related learning – Theoretical foundations. In M.-L. STENSTRÖM / P. TYNJÄLÄ (Eds.), *Towards integration of work and learning: Strategies for connectivity and transformation* (pp. 11–37). Springer.

TYNJÄLÄ, P. / COLLIN, K. (2000). Koulutuksen ja työelämän yhteistyö – pedagogisia näkökulmia. *Aikuiskasvatus, 20*(4), 293–305.

TYNJÄLÄ, P. / VIRTANEN, A. (2005). Skill learning at work: Investigations into student experiences of on-the-job learning. A special issue of the *Finnish Journal of Vocational and Professional Education, Ammattikasvatuksen aikakauskirja,* 2005.

TYNJÄLÄ, P. / HÄKKINEN, P. / HÄMÄLÄINEN, R. (2014). TEL@work: Toward integration of theory and practice. *British Journal of Educational Technology, 45*(6), 990–1000.

TYNJÄLÄ, P. / NUUTINEN, A. / ETELÄPELTO, A. / KIRJONEN, J. / REMES, P. (1997). The Acquisition of Professional Expertise—A challenge for educational research. *Scandinavian Journal of Educational Research, 41*(3–4), 475–494.

TYNJÄLÄ, P. / SLOTTE, V. / NIEMINEN, J. / LONKA, K. / OLKINUORA, E. (2006). From university to working life: Graduates' workplace skills in practice. In P. TYNJÄLÄ / J. VÄLIMAA / G. BOULTON-LEWIS (Eds.), *Higher education and working Life: Collaborations, confrontations and challenges* (pp. 73–88). Oxford: Elsevier.

TYNJÄLÄ, P. / VIRTANEN, A. / KLEMOLA, U. / KOSTIAINEN, E. / RASKU-PUTTONEN, H. (2016). Developing social competence and other generic skills in teacher education: Applying the model of integrative pedagogy. *European Journal of Teacher Education, 39*(3), 368–387.

UNESCO (2005). *Toward knowledge societies.* UNESCO world report. Accessed 13 November 2017: http://www.unesco.org/publications

URSYN, A. (2013). Perceptions of Knowledge Visualization: Explaining Concepts through Meaningful Images. Hershey, PA: IGI.

VÄLIMAA, J. / PAPATSIBA, V. / HOFFMAN, D. (2016). Higher education in networked knowledge societies. In D. HOFFMAN / J. VÄLIMAA (Eds.), *Re-becoming universities?: Higher education institutions in networked knowledge societies* (pp. 13–39). *Changing Academy: The Changing Academic Profession in International Comparative Perspective, 15*. Springer.

VIROLAINEN, M. (2004). Työhön sopeutumisesta oppimisen tilanteiden luomiseen - Ammattikorkeakoulujen työelämäjaksot ja työstä oppimisen mallit. In P. TYNJÄLÄ, J. VÄLIMAA / M. MURTONEN (Eds.), *Korkeakoulutus, oppiminen ja työelämä* (pp. 213–233). Jyväskylä, Finland: PS-kustannus.

VIROLAINEN, M. (2007). Workplace Learning and Higher Education in Finland: Reflections on Current Practice. *Education + Training, 49*(4), 290–309.

VIROLAINEN, M. (2014). *Toward connectivity: Internships of Finnish universities of applied sciences.* (Doctoral dissertation, University of Jyväskylä, Finnish Institute for Educational Research). Accessed 12 November 2017: https://jyx.jyu.fi/dspace/bitstream/handle/123456789/43018/978-951-39-5588-5.pdf?sequence=1

VIRTANEN, A. / TYNJÄLÄ, P. (2008). Field-specific educational practices as a source for students' vocational identity formation. *European Journal of Vocational Training, 44,* 199–213.

VIRTANEN, A. / TYNJÄLÄ, P. (2018). Factors Explaining The Learning of Generic Skills: A Study of University Students' Experiences. (Submitted).

VIRTANEN, A. / TYNJÄLÄ, P. / COLLIN, K. (2009). Characteristics of workplace learning among Finnish vocational students. *Vocations and Learning 2*(3), 153–175.

VIRTANEN, A. / Tynjälä, P./ Eteläpelto, A. (2014).Factors promoting vocational students' learning at work: study on student experiences. *Journal of Education and Work*, 27 (1), 43-70 doi:10.1080/13639080.2012.718748 Open access

VYGOTSKY, L. S. (1986). *Thought and language.* Cambridge, MA: MIT Press.

WENGER, E. (1998). *Communities of practice: Learning, meaning and identity.* Cambridge: Cambridge University Press.

WHEELAHAN, L. (2009). The limits of competency-based training and the implications for work. In J. FIELD, J. / GALLACHER / R. INGRAM (Eds.), *Researching transitions in lifelong learning* (pp. 201–212). Abingdon, Oxon: Routledge.

WOLF, A. (1995). *Competence-based assessment.* Buckingham: Open University Press.

WOLF, A. (2011). *Review of Vocational Education.* Accessed 10 November 2017: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/180504/DFE-00031-2011.pdf

YOUNG, M. F. D. (2008). *Bringing knowledge back in: From social constructivism to social realism in the sociology of education*. London: Routledge.

PÄIVI TYNJÄLÄ
University of Jyväskylä, Finnish Institute for Educational Research PO Box 35, FI-40014
University of Jyväskylä, Finland, paivi.tynjala@jyu.fi

MAARIT VIROLAINEN
University of Jyväskylä, Finnish Institute for Educational Research PO Box 35, FI-40014
University of Jyväskylä, Finland, maarit.ha.virolainen@jyu.fi

HANNU L. T. HEIKKINEN
University of Jyväskylä, Finnish Institute for Educational Research PO Box 35, FI-40014
University of Jyväskylä, Finland, hannu.l.t.heikkinen@jyu.fi

ANNE VIRTANEN
University of Jyväskylä, Finnish Institute for Educational Research PO Box 35, FI-40014
University of Jyväskylä, Finland, anne.virtanen@jyu.fi