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Pedagogical perspectives on the relationships between higher education and working life

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Abstract. The relationship between higher education institutions and their environment has changed markedly during the last two decades. Massification and diversification of the higher education system, economic globalisation, novel modes of knowledge production, new professional requirements and the establishment of new vocational higher education systems in many countries have challenged higher education institutions to develop new forms of collaboration with working life. The new situation also challenges higher education to develop pedagogical and educational thinking and practices. The purpose of this article is to examine the pedagogical aspects of the increasing interaction and collaboration that is taking place between higher education and working life and to outline what kind of challenges it poses for research on higher education. It is emphasised that from the pedagogical viewpoint integration between theory and practice in work-based learning is essential. Our general conclusion is that the relationship between higher education and working life should be examined at least from four different perspectives: (1) from the viewpoint of student learning and the development of expertise, (2) from the viewpoint of educational institutions and staff, (3) from the viewpoint of working life organisations and employers, and (4) from the viewpoint of society and the system of education.

Keywords: acquisition of expertise, higher education, professional expertise, student learning, work-based learning, working life

Introduction: Changing relationships between higher education, society and working life

The circumstances in which higher education institutions operate have altered considerably during the last two decades changing fundamentally the relationship between higher education institutions and their environment. The most important contextual factor in this change is *the massification of higher education systems*, which should not, however, be understood purely technically as a reference to the expansion of students, faculty, and higher education institutions, but in the cultural sense as a series of multiple modernizations (Scott 1995). Thus, the key components of massification are not only the expansion of the system, but also institutional diversity, organisational complexity, and academic heterogeneity (Bargh et al. 1996).

The conditions of knowledge production are, in turn, challenged by social change. In the postindustrial society new structures and practices of indus-

trial production have made enterprises more heavily dependent on the new information technologies and new kinds of expertise (Reich 1991; Dill and Sporn 1995; Tynjälä et al. 1997). Furthermore, it has been suggested that a new form of knowledge production is emerging alongside the traditional, familiar one. As Gibbons (Gibbons et al. 1994) and others have suggested, the parameters for the new kind of knowledge production are set in the context of application, and the nature of research may be changing into transdisciplinary problem solving that aims at useful outcomes. It even seems that the traditional dichotomies between basic and applied research, or between theory and practice are no longer adequate. In a university existing in a social context of application (negotiations, interests, reflexivity) it is relevant to ask not only whether research accumulates disciplinary-based knowledge, but also whether it is useful for society. The new mode of knowledge production easily increases differences inside academia between those fields which can "capitalise" their knowledge more easily as compared to those disciplines which depend mainly on public funding (see Bauer et al. 1999; Slaughter and Leslie 1997)

In the new university framework, which Välimaa (1999) has called the *pragmatic university*, there is a need to redefine the aims, goals and ethics of research and instruction from a new perspective that is not rooted in the Humboldtian ideals of an autonomous university, but in the relationship between society, business enterprises and the academic world. In a pragmatic university the triple helix relationships between universities, business enterprises and society as well as the dynamics of knowledge production are interconnected with each other more strongly than in the traditional Humboldtian university, because disciplinary principles (Toulmin 1992) are challenged by the practical orientations of the higher education institutions. Externally, pragmatic universities are expected to be productive and efficient higher education institutions with high social accountability and quality of education. Internally, the changes in the university-society relationship have influenced the conditions of academic work creating new dynamics in knowledge production and in university pedagogy and educational practices.

In addition to these changes, the clienteles of higher education institutions have multiplied. According to Burton Clark (1995), "mass, even universal, access in place or on its way means that not only there are more students but more different types of students". Following the same rationale, there are not only more graduates going on to the job market, "but more different types of graduates are being prepared for more diverse occupational specialities" (Clark 1995). This makes the transition from education to the workplace a more complex and problematic (see, Arnold 1985; Candy and Crebert 1991; Mulder and Finch 1997). Therefore, in most countries the role and organisation of higher education are being questioned by new student

demands and a more competitive environment for universities. Economic globalisation together with neo-liberal policies adds its own flavour to the situation (Marginson and Mollis, in press). Multi-national business enterprises as well as national and local enterprises are challenging traditional higher education institutions to change their traditional orientations. Therefore, economic globalisation through trends towards market-like mechanisms and entrepreneurial behaviour may dominate institutional responses whereas cultural globalisation challenges the contents and structures of higher education curricula. The globalisation of education markets, in turn, challenges traditional higher education institutions because national higher education institutions no longer will have a self-evident monopoly to produce 'national' professionals for 'national' labour markets (see Välimaa 2001).

In many European countries the social dynamics of the higher education system have also been changed by the establishment of new vocational higher education systems over the past decade. One of the main objectives for these new institutions is to direct higher education towards the needs of working life, catering especially for regional and local needs. In other words, the new higher education institutions are expected to develop vocational know-how and competitiveness regionally by combining the needs of working life, vocational training, and theoretical and practical knowledge. Special emphasis has been placed on developing new forms and methods of teaching, practical training, diploma work and co-operation with industry. In this way these new institutions have not only spurred traditional universities to develop their curricula but also set new challenges in terms of contacts with the private sector. In short, the issue of the relationship between higher education and working life is in the core of defining the identity of higher education institutions, and more importantly, it is the question structuring the relationship between higher education and society.

In this article we shall deal with the changing higher education – working life connection from pedagogical perspectives in general and from the viewpoint of student learning and the acquisition of expertise in particular. We start by examining the differences between learning in education and learning at work after which we analyse the changes in the ways in which the development of professional expertise has been handled in higher education. Thereafter we bring forward perspectives raised by research on learning and the acquisition of expertise, with special emphasis on the importance of integrating theory and practice or science and work. We continue by presenting different forms of work-based learning and analysing how they are changing. At the end of the article we stress the social nature of professional expertise and the role of collaborative learning as a tool for developing and promoting it. Finally, we outline the challenges for current research on higher education and working life.

Learning in formal education and learning at work

The relationship between higher education and work has mainly been analysed from the perspective of graduate employment, mostly from the viewpoint of economists (Brennan et al. 1996; see also Ahola and Silvennoinen 1999; Geiss and Schmidt 1999). However, in recent years educational researchers have joined the discussion and brought more educational and pedagogical viewpoints to bear on it (e.g. Boud 1998; Trigwell and Reid 1998; Boud and Solomon 2001). As different forms of work-based learning in higher education are becoming more widely applied, it is important to analyse the actual processes and the quality of learning in these contexts and to examine the contexts themselves as learning environments. Workplace learning is a very complex phenomenon which so far lacks systematic, sensibly conceptualised and comprehensive theorisation (Boud et al. 1998; Hager 1998).

Nowadays it is widely acknowledged that learning is a phenomenon that is situated in its cultural context (e.g. Brown et al. 1989; Darrah 1995; Resnick 1987). Therefore, learning in a workplace environment is very different from that at school or in a university environment. One of the main differences between learning in the educational system and learning at work is that the former is based on formal, intentionally planned educational activities while the latter is mostly informal in nature (Marsick and Watkins 1990; Eraut et al. 1998).

Resnick (1987) was one of the first scholars to analyse how school learning differs from other types of learning. According to her analysis there are at least four types of differences. First, school practices are mostly based on individual activities while much outside-school activity is socially shared. Although group activities of various kinds are gradually becoming more common at schools and colleges, students are still usually judged on the basis of individual tasks and tests. In contrast, many activities at work require collaboration with other people, and each person's ability to function successfully depends on performances of several individuals. Second, school work emphasises purely mental activities but in real life people use different kinds of tools. For example, traditional assessment of learning is based on memory alone – the use of books and notes, calculators or other instruments is not normally permitted. In contrast, tool use in work activities, both physical and mental, is more the rule than the exception. Third, according to Resnick, symbol manipulation is characteristic of school learning while other learning is characterised by contextualised reasoning. People outside school often use objects and events directly in their reasoning, without necessarily using symbols to represent them. School learning, by contrast, is mostly symbol-based, and connections to the events and objects symbolised are often lost.

For example, in everyday mathematics people may use real physical objects as a part of their calculating process, whereas school mathematics operates purely with numbers. Fourth, school learning aims towards generalised skills and principles but learning outside school develops situation-specific competencies. This is both a strength and weakness of school learning. After all, formal education is intended to produce general skills that can be then applied and transferred to a variety of situations. However, in order to be a true expert in working life one has to develop situation-specific forms of competence, and this is possible only in authentic situations. On the other hand, situation-specific learning by itself is very limiting. Something learnt in one situation is not easily transferred to another type of situation.

Altogether, Resnick's analysis shows that the nature of learning is different in different contexts. Just as informal learning at work differs from learning in educational settings it also differs from organised on-the-job training or practice periods. Informal workplace learning is unplanned and implicit, often collaborative and highly contextualised, and the learning outcomes unpredictable, whereas on-the-job training is often formal, planned, largely explicit, focused on individual learning, and the outcomes are often predictable (Hager 1998). However, the difference between school learning and workplace learning is not always so clear. The workplace may also be a context for formal employee training. Large companies especially have put a lot of effort into corporate training. In recent years, the role of the university has often been important in corporate training programmes. Robertson (1998), for example, speaks about interactive business learning where the university extends its reach beyond the campus to organisations and workplaces which encourage learning (see also Kautto-Koivula 1993, 1999; Slotte 2001; Slotte and Tynjälä 2002). In these workplaces formal training plays an important role in organisational development.

It is very likely that increasing co-operation between education and work and new forms of work-based learning (WBL) will change the nature of learning in both contexts and may create entirely new kinds of learning opportunities (see Candy and Crebert 1991). Work-based learning may be realised in various modes and through different programmes ranging from single courses involving a small working life project to more comprehensive programmes which depart substantially from the disciplinary framework of university study (Boud et al. 2001). We assume that there are at least two factors which may narrow the gap between learning in higher education and learning at work. First, globalisation and the emergence of the information society seems to be leading to an increasing amount of jobs that Reich (1991) has called symbolic-analytic services. In these jobs professionals identify and solve problems by manipulating symbols. They use and transform informa-

tion with analytic tools such as mathematical algorithms, scientific principles, psychological insights, legal arguments, and so on. The nature of symbol manipulation of this kind is much like the nature of school work: context-specific reasoning is not enough but abstract thinking and an ability to analyse and synthesise information is required. In this way the conceptual reasoning and abstraction emphasised in educational settings and school learning is, indeed, an essential element of key jobs in working life today. Another factor that is narrowing the gap between education and work is the fact that new pedagogical models such as problem-based learning, project learning and collaborative learning have characteristics that simulate authentic situations in working life or may be even based on them. Problem-based learning is a curriculum development and instructional approach that applies problematic situations adapted from real world issues as a starting point to learning and studying (see, e.g. Boud and Feletti 1991; Albanese and Mitchel 1993; Norman and Schmidt 2000; Savin-Baden 2000). The courses are structured around problems rather than subjects or disciplines, and theoretical material is studied to find solutions to practical cases. Students are encouraged to apply their existing knowledge and to identify their further learning needs in cooperation with other students. Working life-oriented project-based learning is a similar approach applying cooperation and collaboration, but it differs from problem-based learning in its emphasis on producing a concrete end product for the client organisation (see, e.g. Tourunen 1992, 1996; Olesen and Jensen 1999; Tynjälä and Tourunen 2002).

At a moment when we are facing these diverse changes in the interface of higher education and working life we need both conceptualised and contextualised, critical and accessible research-based knowledge about the learning processes and learning environments in this interface (Boud et al. 1998). When examining different forms of education-working life co-operation and work-based learning it is important to understand the fundamental nature of learning at work. What is workplace learning? How does learning at work take place? What are the constraints and prerequisites of learning at work? Therefore, not only studies of the work-based learning of higher education students but also research on the informal learning taking place in the every day work of employees is important. We believe that, ultimately, both for students and for employees the aim of work-based learning is the development of professional expertise. Therefore conceptions of expertise and models of learning and the acquisition of expertise have a key role in developing collaboration between higher education and working life. In the following sections we move on to these issues.

Learning theories and the education-work relationship

The interaction between education and work and intensifying students' participation in real life practices can be argued for on the basis of various learning theories. For example, sociocultural and situated-learning theories have emphasised that learning takes place through participating in communities of practice. From this point of view it is important that education involves students in authentic practices and in social interaction (e.g. Brown et al. 1989; Lave and Wenger 1991; Rogoff 1991; Darrah 1995; Wenger 1998). Similarly, activity theory and developmental work research integrate learning and the development of work (Engeström 1996, 2001). Dewey's classical notion of learning-by-doing highlights the significance of concrete experiences and reflecting on them as do theories of experiential learning (e.g. Kolb 1984). Further, the notion of the reflective practitioner (Schön 1987) and theories of informal and incidental learning (Marsick and Watkins 1990) support the idea of learning actually taking place through work. The constructivist view of learning and cognitive research on expertise also provide important arguments for integrating education and work by emphasising the importance of the active role of the student and the integration of theoretical and practical knowledge (Bromme and Tillema 1995; Leinhardt et al. 1995; Mäkinen et al. 1999; Tynjälä 1999; Tynjälä et al. 1997).

Research on learning and the development of expertise has followed two major pathways which Sfard (1998) has labelled the acquisition metaphor and the participation metaphor. The former analyses learning as knowledge acquisition while the latter emphasises that learning is a process of becoming a member of a certain community and becoming able to communicate and participate within this community. The acquisition metaphor provides us with an understanding of individuals' cognitive knowledge construction while the participation metaphor involves a cultural view of learning. These different paradigms may be seen as complementary, being both needed in order to understand the nature of learning in general and work-based learning in particular. Thus, we support Billett's (1996, 1998) idea of taking into account both the cognitive constructivist and sociocultural perspectives or the acquisition and the participation metaphors and favour an approach which examines learning and the development of expertise as a knowledge construction process which takes place in reciprocal interaction between individuals and their sociocultural environment. We consider the harmony between the cognitive and social constructivist, contextual and sociocultural approaches as a promising framework in which to develop expertise in the interface of education and work. Pivotal in the learning process is the social interaction which takes place, for example, between learners and teachers, between learners and workplace tutors, between teachers and employers, and between

learners and other learners. Therefore, special attention should be paid to the ways in which knowledge and shared understanding is constructed in these various social relationships and dialogues.

A key to expertise: Integration of theory and practice

Expert knowledge consists of different elements, usually divided into three main components: (1) formal, theoretical knowledge, (2) informal, often tacit, practical knowledge and (3) self-regulative knowledge (e.g Bereiter and Scardamalia 1993; Eraut 1994; Eteläpelto and Light 1999). Traditionally, the different components of expert knowledge have been studied separately in research on learning and expertise. While educational studies of school learning have focused on the acquisition of formal knowledge, the development of practical knowledge has been examined in working-life contexts. Self-regulative knowledge has received attention from both educational and working-life researchers, although theorists of adult education have discussed it in terms of reflective thinking and theorists of student learning in terms of metacognitive skills.

In recent years, attention has begun to be paid to the importance of the integration of the different components of expert knowledge in learning and in the development of professional expertise (Bereiter and Scardamalia 1993; Bromme and Tillema 1995; Desforges 1995; Leinhardt et al. 1995). Becoming a professional is not a process of substituting experience for theory but a process of fusing theory and experience (Bromme and Tillema 1995). Accordingly, from the educational viewpoint the central question is whether and how this integration takes place during education and training. Learning researchers have several answers. For example, Boshuizen et al. (1995) have shown that in the course of the development of expertise the detailed theoretical concepts acquired by students will be replaced by concepts of a more general type that more or less summarise the detailed ones. This *process of knowledge encapsulation* is a result of repeated knowledge application in the context of practical experience. Leinhardt and colleagues (1995) argue that true integration of theoretical and practical knowledge is best fostered when university students transform abstract theories and formal knowledge for use in practical situations and, correspondingly, when they employ their practical knowledge to construct principles and conceptual models. Thus, *theorising practice* and *particularising theory* are suggested as the keys to the development of expert knowledge. Experiential learning theorists refer to this same process in terms of *reflection*: learning takes place through a cycle of experiences, reflection, conceptualisation and experimenting (Kolb 1984). Further, according to Bereiter and Scardamalia (1993), converting formal knowledge

into an expert's informal knowledge and skills is pivotal in the development of expertise. This takes place when formal knowledge is used for the purposes of *problem-solving*. Thus, problem-solving is considered a mediating tool for integration of the different components of expert knowledge.

In the traditional higher education curriculum, theory and practice have tended to be separated from each other and learnt in isolation. Even today there is commonly no connection between theoretical courses and practice periods. This type of traditional curriculum does not correspond with the views regarding the development of expertise described above. An integrated approach involving theorising practice, conceptualising practical experiences and developing self-regulative, meta-cognitive and reflective skills offers a more promising gateway towards the development of expertise (Leinhardt et al. 1995; Tynjälä 1999). Getting students to cross boundaries between education and work through different forms of work-based learning would seem to provide a promising starting point for developing the prerequisites for professional expertise. However, this requires that true integration of theoretical, practical and self-regulative knowledge takes place and that students really are allowed to solve complex and ill-defined problems during their work-based learning (WBL) periods. When different forms of WBL are being developed as a part of the educational system there is a danger that theory and practice will continue to be separated from each other. Students may consider WBL as the development of "true" competencies whereas learning in educational settings may be regarded as useless "swotting up" theory. For this reason, it is important that when WBL in higher education is being developed this separation is prevented and that theoretical analysis and reflection on work experiences will be an essential part of education and WBL. Thus, the pedagogical key question in the collaboration of education and work is how to build a firm connection between theory and practice or science and work. Furthermore, the development of students' reflective and meta-cognitive skills should also be integrated with work and learning. Teachers are challenged to guide work-based learning so that the students are required to conceptualise and reflect on their work experiences and examine them in the light of theoretical knowledge and, correspondingly, to examine theoretical knowledge in the light of practical work. Learning journals and group discussions, for example, integrated with WBL, may serve as tools for reflection (e.g. Cooper 1998; Dunlap 1998; Lyons 1999).

So far, the learning processes in work-based learning are only vaguely known and we do not know whether WBL leads to the integration of theoretical and practical knowledge and what the critical points are that need further development. Therefore there is a need of intensive process-oriented studies in this field.

Forms of work-based learning

The term work-based learning has been used to refer both to employees' learning at work (Keeling et al. 1998) and students' learning taking place through practice periods, working life-oriented projects, excursions, adult students' work experience or other forms of working life connections (e.g. Trigwell and Reid 1998; Clark and Whitelegg 1998; Kivinen et al. 1999; Boud and Solomon 2001). In the USA, another educational approach similar to work-based learning is called service learning (e.g. Kahne and Westheimer 1996; Sheckley and Keeton 1997; Weigert 1998). Common to WBL and service learning is the idea of learning-by-doing and an emphasis on active, experiential and collaborative learning. In addition, both are based on the same variety of theoretical paradigms, such as Dewey's theories of learning and the experiential learning theory. The main differences between WBL and service learning is that the former emphasises the individual's occupational development whereas the latter is based on an ideological principle of serving the good of the community and society.

There has been a lot of variety in higher education curricula in terms of their relationships to work. For example, curricula can be strongly directed towards preparation for research and the creation of knowledge or towards the reproduction of knowledge; curricula can be geared closely to occupational preparation or they can be unrelated to it; curricula can vary according to the degree of specialisation; curricula can focus on a single discipline or combine various disciplines; and some fields of study prepare students for 'corresponding' professions, while graduates from other fields will be widely dispersed (Brennan et al. 1996). There is also a variety of ways in which learning experiences from working life can be organised for students. Stern and his colleagues (Stern et al. 1998) have identified four different types of work-based learning in the USA: (1) Learn-and-stay, using firm-based work experience; (2) Learn-and-go, using firm-based work experience; (3) Learn-and-stay, using school-sponsored enterprises; and (4) Learn-and-go using school-sponsored enterprises. The learn-and-stay type of work-based learning prepares students for specific occupations or industries, whereas learn-and-go develops more broadly transferable knowledge and skills. Furthermore, Trigwell and Reid (1998) divide work-based learning into four categories: (1) learner-managed or learner-led work-based education, (2) workplace-based education, (3) education involving work placement, and (4) practice-based education. These forms differ from each other in terms of control over the curriculum (student, work issues, university or employer), reason for course (students' own aims, staff development, scholarly work, gaining work experience or gaining work-related experience), the origin of the learner (university or employment), and location of the learning (university or work-

place). Altogether, WBL may take place in a variety of forms, such as in brief encounters, excursions, working life-oriented projects, diploma work or masters theses, sandwich courses, an alternating sequence of placements, and student vacation or part-time employment.

Project-based learning is a pedagogical innovation which applies the idea of integrating theory and practice by problem solving and by bringing working life problems closer to students (Blumenfeld et al. 1991; Eteläpelto and Tourunen 1994; Olesen and Jensen 1999; Peterson and Myer 1995; Poell et al. 1998a; Poell et al. 1998b; Poell et al. 1999; Tourunen 1992; 1996; Tynjälä and Tourunen 2002). In a project, learners work collaboratively on an actual (or simulated) real-life problem. This way students can apply theories in practice and learn group work as well as communication and co-operation skills in an authentic learning environment. It has been argued that project-based learning could overcome the disadvantages of both formal training and unstructured everyday learning while capitalising on their strengths (Poell et al. 1998a).

In traditional forms of WBL control remains essentially with higher education providers rather than with employers, and with tutors rather than students. Now there is a tendency towards learning contracts, negotiated program contents, and three-way partnerships between the learner, the university and the employer, usually based on real-time, work-based projects (Foster and Stephenson 1998). According to Foster and Stephenson, these new programs are characterised by a shift in program design and control from universities towards employers and employees. Responsibility is shared amongst the stakeholders, but the student has a key role in determining his or her own needs and aspirations. This way students' learning programs become integrated into their work activity. The provision of such customised education increases the scope for program innovation, but it also increases value conflicts both within and across stakeholding institutions, exposing differences in expectations and experiences. The specific interests of students and employees may not be aligned, and the interests of both diverge from those of organisations and employers (Hughes 1998). For these reasons, it is important that the research on WBL covers the viewpoints of all stakeholders.

Foster and Stephenson (1998) have noted that student-managed WBL programs, such as real-time projects throw up a number of challenges for higher education, including definitions of suitable learning environments, the roles of academic staff, distribution of resources, the control of what is learnt and the establishment of standards of performance. A traditional control-oriented system in which student learning is predetermined by the academic staff and subject boundaries does not work in situations in which content and learning methods derive from the needs of the project and the circum-

stances of the workplace. According to Foster and Stephenson (1998), in an ideal situation work-based learning is "performance or task related (requiring evaluation), problem-based, autonomously managed, team-based, concerned with company performance enhancement, and innovation centred".

Shared expertise, shared understanding and collaborative learning in education and work

A characteristic of today's professional expertise is its highly social nature. Experts work in collaborative teams, share their knowledge with other experts in their domain and experts from other domains and communicate over multi-professional networks. In education and in working life collaborative work and collaborative learning have become both tools for learning and objects of learning. How knowledge is constructed, shared and used in organisations and how teams and organisations learn have become pivotal questions in organisational development (e.g. Argyris and Schön 1996; Nonaka 1994). Although lately collaborative and organisational learning have been a common focus in research on higher education and working life, little attention has been paid to the differences and similarities, as regards collaboration and the construction of meaning, between formal and informal learning environments. It is noteworthy that in both environments, dialogue has been acknowledged as the main tool for constructing shared expertise, knowledge and understanding.

In studies of formal learning collaborative dialogues have mostly been used for the promotion of self-reflective learning (Imel 1992; Isaacs 1993; Tillema 1997), a knowledge construction process based on an interaction between students' experiences and their socio-cultural environment. In this approach, the student progresses from novice to expert inside developmental or reflective paradigms (Johnson 1997). Such paradigms include reflective dialogue, that is, student discussions focused on students' introspection during their own learning and on their reflections on their personal experiences, in a certain situation, against the background of those of other students. As mentioned above, situation- or context-specific learning can, however, be very limiting.

A possible way to bring higher education closer to the needs of working life lies in *organisational or critical* dialogue, which involves an orientation towards various work practices and a sceptical perspective; (Gustavsen 1992; Burbules 1993; Sarja 2000). In her study "Dialogic learning in a small group" Sarja (2000) singled out as a central feature of learning of this kind going beyond a local context, made possible by a communicative competence ('implicit knowledge') acquired in professional practice. Here knowledge and understanding have not only been shared and reconstructed

but at the same time deconstructed by questioning the given work practices and the knowledge embedded in them (cf. Johnson 1997). In the development of professional expertise, problems encountered in authentic work contexts are the starting point for an integration of theory and practice or work and research. Compared to reflective dialogue, critical dialogue addresses the cultural history of the learning organisation and the conflicts arising from the different models of thinking and action adopted by each organisation.

Sarja's studies indicate that there is a need to deepen our understanding of the knowledge construction processes taking place between and the quality of the dialogues entered into by students and their workplace trainers, mentors or supervisors in different types of work-based learning. In organisational or critical dialogic learning, the supervisor/consultant/advisor/teacher renders visible the implicit and tacit knowledge accumulated during their life history by participating in these learning and working activities. Accordingly, examining and comparing supervised interaction patterns in collaborative work across different educational contexts located in the interface between higher education and working life is a fundamental challenge for future research. Altogether, it is important to analyse the organisational, situational and individual preconditions of boundary crossing and innovative learning and to identify the obstacles that prevent the participants from engaging in innovative learning in collaborative situations.

Conclusions

On the basis of the preceding analysis we suggest that it is important to examine interaction and collaboration between higher education and working life from at least four different perspectives: (1) from the viewpoint of student learning and the development of expertise, (2) from the viewpoint of educational institutes and staff, (3) from the viewpoint of organisations and employers in working life, and (4) from the viewpoint of society and the system of education.

From the first perspective it is important to examine how expert knowledge is constructed and developed in work-based learning. Answering this question requires a detailed analysis of learning processes in formal as well as in informal learning situations. Therefore, it is important that the scope of studies covers different learning contexts and different forms of work-based learning both in workplaces and in educational environments. Given that the contemporary working culture is much characterised by collaboration and shared expertise, studies should focus on collaborative learning and team work in particular and include analyses of dialogues between experts and novices. It is also important to analyse what kinds of learning outcomes will

be produced by different forms of work-based learning in higher education – in other words, what do students learn through work-based learning? From the viewpoint of the development of expertise a very important question is whether and how theory and practice are integrated in different forms of work-based learning and how innovative learning at work and in education comes about. The issue of transfer is an important problem when analysing students' learning through work. How can it be guaranteed that students' understanding and skills are not confined only to the particular job and workplace he or she is working in? How can more generalised knowledge and skills be developed? We suggest that integration of theory and practice may be one possible answer to these questions. While immediate work experience provides students with particular, situation-specific knowledge, theory provides them with conceptual, general knowledge. The integration of these elements of expertise may promote the transfer of learnt skills to new environments. We suggest that this is one of the most promising hypotheses requiring further research.

From the viewpoint of educational institutes and academic staff it is important to examine how interaction and collaboration between higher education and work is interpreted, conceptualised and experienced in universities and other higher education institutes. For example, what kind of educational and pedagogical challenges does this collaboration pose to teachers and tutors? How does co-operative and work-based learning affect teachers' and tutors' work? How do teachers and tutors of work-based learning see their role in the learning process? Do university teachers' and students' conceptions of professional expertise in their domain differ from those held by professionals in authentic working life?

The main stakeholders in the business of work-based learning are private and public sector employers offering work experiences to students, regular employees, trade unions and the students themselves. Presumably, employers' expectations of and interests in collaboration with educational institutes differ from those of teachers and students – and these may be other than those of regular employees. Thus, it is important to examine what kinds of problems and conflicts linking learning to the workplace may arise between the different partners and stakeholders. In order to identify possible value conflicts it is important to conduct large scale surveys on the needs, aims and expectations of employers about work-based learning and collaboration with higher education. We need information about how working life organisations see work-based learning as an investment in human capital and how employers and employees experience the different forms of work-based learning available to higher education students.

Finally, interaction between higher education and working life is a broad question and it is related to the very identity of higher education institutions and their relationship to society. The findings of empirical studies on working life collaboration should therefore be synthesised with a theoretical analysis on the general level. Analyses of this kind would answer such questions as: What kind of new challenges does cultural and economic globalisation pose to the development of higher education? What kind of changes are taking place in the relationship between higher education institutions and society? In what respects has the autonomy of higher education institutions changed in the context of the new pragmatic university? and What new challenges to the various disciplines have been created by working life and the processes of globalisation? Altogether, collaboration and interaction between higher education and working life is a phenomenon which requires transdisciplinary and multi-level analyses focusing both on individual actors or stakeholders and on system-level questions.

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