



**FEWL**

ENHANCING RESEARCH  
ON THE INTEGRATION OF  
FORMAL EDUCATIONAL PROGRAMMES  
AND WORKPLACE LEARNING

**Working paper on contemporary theoretical foundations and  
methodology of research of integration of school learning and WPL**



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## **Executive summary**

The working paper explores the theoretical foundations and methodology of integrating work and learning, focusing on significant aspects of school learning. The text includes a collection of subchapters. Also, some short overviews of recently published relevant research papers of FEWL project members and reading suggestions are included.

The working paper is to be a basis for discussions about the next steps of the research-related activities within the FEWL project. Therefore, not all parts of this text have been edited.

Since it is a working paper, some repetitions of ideas or partial overlaps between text parts have not been avoided. Instead, themes are seen with greater resonance for the project team in these overlaps.

## **Introduction**

Although research on workers' education, in general, has long historical roots, the term "workplace learning" was internationally adopted in the 1990s along with "learning organization" from the field of organizational development into adult education (Marsick & Watkins, 1996; Senge, 1991). Nevertheless, research in these related fields quickly gained importance, in the context of integrating learning at school and work previous research activities have mainly focused on vocational education. Following the discussions on how education can address changes in societies and working life, we see the potential to widen the research in this area by extending the target group. Besides VET students, we will focus on students in basic education and upper secondary general education.

The discussions on how to achieve a better match of formal education and working life, how formal education can better contribute to the smooth transition of youth to work and how the participation of students in authentic working environments can contribute to the development of various competencies are escalating worldwide. A good example of how these ideas influence political decisions are various documents of the EU such as the Council Recommendation on Key Competences for Lifelong Learning which have been adopted by all member states in their national curricula (NC). The eight domains of key competencies include literacy, multilingualism, numerical, scientific and engineering skills, digital and technology-based competencies, active citizenship, entrepreneurship, cultural awareness and expressions. They are needed in many spheres of life in order to become good humans and citizens and last but not least for employability. Since key competencies are to be developed, in addition to all school subjects, through extracurricular and out-of-school activities (see e.g. Estonian National Curriculum for Basic Schools – ENCBS, 2011; Uppin & Timoštšuk, 2019), the responsibility for their development should be shared between many persons of influence in students' lives such as family, teachers, instructors in non-formal education and employment. However, the NC gives this responsibility mainly to teachers who tend to be overwhelmed with the task (Erss, 2018; Näkk & Timoštšuk, 2021). Furthermore, the instruction in general education schools tends to be subject-centred and as such does not effectively support the development of key competencies (Valk, 2019). Despite the increased attention, that the NC and educational strategies (e.g. Estonian Strategy of Lifelong Learning 2020) pay to enhance learner engagement through learning in authentic environments, integration of subjects, theme-based learning and learner autonomy support, these aims which characterize the contemporary approach to learning are not evenly implemented across the formal education system (Praxis & Centar, 2019, p. 105). This indicates that there is a need to explore the

possible synergy of formal, non-formal and workplace learning in supporting the development of key competencies and student agency.

Further justifications for the integration of various learning environments follow from the lifelong learning imperative, which requires a much more flexible formal education. “School learning” and curriculum development in formal education that used to be designed for mass education, can hardly respond to the fast changes outside the school and particularly in working life. Furthermore, students who study in formal education, simultaneously participate and learn ever more frequently in various out-of-school sites/environments and networks, including work settings. That means, their learning experiences become increasingly diverse and individualized.

Workplaces are extensively recognised as learning environments where working is interwoven with learning which contributes to the development of competencies needed for constructing individual learning paths (ILP). Rather than being separate and linear phases of the ILPs, learning in and outside the school, in formal education and in working life, has become more and more intertwined and, therefore, the integration of working and formal learning is becoming more critical than before (e.g. Tynjälä et al., 2021, p. 3)

Students’ participation in various activities and environments outside the school (such as working temporarily or even permanently, participation in voluntary work or in other extracurricular activities) can be seen as a source of rich learning experiences that potentially contribute to the development of students’ competencies and agency. In other words, students learn best when they are engaged in their learning and supported to develop a rich contextual understanding of what they learn (Kaplan & Patrick, 2016).

## **1. Research on employees’ and students’ workplace learning**

### **1.1. Different research lines (Päivi Tynjälä)**

Due to fast changes in society and the world of work, research on workplace learning, work-based learning, and work-related learning has substantially expanded during the last few decades. Tynjälä (2013) has clustered the wide research field into the following research lines: 1) Studies illustrating the nature of workplace learning, 2) Research on agency and work identities 3) Research on the development of professional expertise; 4) Inquiries into competence development in the interface between education and work; 5) Studies of communities of practice; and 6) Research on organizational learning. While five of these categories focus on employees’ learning in work organizations, the fourth one concerns students’ learning through work placements, internships, work-based projects, and other forms of work experience provided by the education system.

The first studies on workplace learning illustrated learning at work as an informal and non-intentional activity which is not always easy to recognize (Marsick & Watkins, 1990; Eraut 2004a,b; Billett, 2002a,b). Schön (1987) had coined the term ‘reflective practitioner’ which was seen as a basic process of learning at the workplace. Eraut (2004 a,b) made a distinction between three types of informal learning: (1) implicit, (2) reactive and (3) deliberate learning. The first one refers to the unconscious

process (e.g. socialization into workplace practices), the second one to intentional learning in an unexpected situation requiring fast action, and the third one to learning taking place in situations in which there the working task has a clear goal with learning as a by-product.

While the informal nature of learning at work is widely recognized, Billett (2002a, 2002b, 2004, 2011a) has emphasised that in workplaces there are many formalities and structures and paths for career development which require learning and can be seen as a kind of workplace curriculum. In addition, at least occasionally formal in-service training is organized in most workplaces. Because of increasing knowledge and fast changes of technology and working methods incidental learning at work is not enough, and more intentional learning and formal training is needed. The concepts such as workplace pedagogies and pedagogical practices are often used in this context (e.g., Billett 2002a, b, Billett 2011; Eteläpelto 2008, p. 241; Fuller and Unwin 2002). These kind of activities include, for example, mentoring and group-based peer mentoring (e.g., Heikkinen et al. 2012). Billett (2002b) has identified three kind contexts of pedagogical practices in the workplace: 1) participation in work activities, involving learning in everyday interactive situations, 2) guided learning such as coaching and modelling, and 3) guided learning for transfer, which aims at using individuals' knowledge and skills in problem solving and scenario building, for example.

Several studies have shown that workplaces differ in how they provide opportunities for participation and learning. For example, Fuller and Unwin (2004, 2011) call expansive workplaces those which offer rich opportunities for learning, and restrictive workplaces those which offer limited opportunities. Expansive organizations arrange time for reflection and support their employees' career development, whereas restrictive workplaces reserve these only for key persons. Expansive workplaces also value innovation, while restrictive organizations rather rely on old practices.

More specific aspects related to workplace learning examined include, for example, e-learning at work (e.g., Brookshire et al. 2011), assessing and measuring workers' learning and skills (Hager 2004; Hoddinott 2004; Winther and Achtenhagen 2011), learning through errors (Bauer and Mulder 2008; Harteis et al. 2008), the role of reflection (Gartmeier et al. 2008), the role of personal epistemologies (Billett 2008), the experience of sharing (Collin and Paloniemi 2008; Collin and Valleala 2005), and transfer of training (Festner and Gruber 2008).

Recent studies on workplace learning have focused, for example, to digitalization (Harteis, 2022; Harteis et al., 2022), identity and agency (Goller & Paloniemi 2022; Vähäsantanen 2022; Vähäsantanen et al., 2021), learning from errors (Rausch et al., 2022), team learning (van den Bossche et al., 2022), innovations and learning (Billett, 2022), and emotions in learning at work (Hökkä et al., 2023).

## **1.2. Concepts and theoretical models for understanding learning at the workplace**

Several models and conceptual frameworks have been developed to increase understanding about learning at the workplace, for example:

- broader/ paradigmatic understandings of learning at work. Possibly such well-known approaches as psychological/cognitive (e.g Kolb); social psychological/communities of practice (e.g Lave and Wenger); social constructivist approaches and others could be considered here.
- Connectivity (Guile, Aprea, Kyndt et al.,)
- 3-P Model of employees' learning at work: Tynjälä 2012 (described below)
- 3-P Model of students' learning at work: Tynjälä et al 2022 (described below)
- widened: i-PPP Model based on 3-P Models: Gruber & Harteis 2018
- Integrative pedagogy Tynjälä et al 2022 (described below)
- Boundary crossing
- LEaRN model (Gerholz & Dormann, 2017)
- Offer-Usage-Model of WPL (Billett, 2008)
- Job demands-control-support model (Karasek, 1998)
- Chain of recontextualisation (Evans, Guile, Harris & Alan, 2010) [Putting knowledge to work: A new approach - ScienceDirect](#)
- macrolevel? ecosystems of learning (<https://doi.org/10.4135/9781529757217.n9>)

Ecologies for learning and practice

(<https://www.taylorfrancis.com/books/edit/10.4324/9781351020268/ecologies-learning-practice-ronald-barnett-norman-jackson>) Savin-Baden, M. (2019). Learning ecologies: Liminal states and student transformation. In *Ecologies for learning and practice* (pp. 46-60). Routledge.

- John Keller's [ARCS model](#) of motivational design of learning (Attention, Relevance, Confidence, Satisfaction) - analysed from adult learner perspective
- organizational and individual (bounded) agency in workplace learning (Hefler & Studena (2023) [https://link.springer.com/chapter/10.1007/978-3-031-14109-6\\_10](https://link.springer.com/chapter/10.1007/978-3-031-14109-6_10))
- institutional, situational & dispositional barriers to (adult) learning (Boeren et al, Roosmaa 2022 (Figure 1!), also general overview Clancy & Holford (2023) [https://link.springer.com/chapter/10.1007/978-3-031-14109-6\\_2](https://link.springer.com/chapter/10.1007/978-3-031-14109-6_2))
- empowering aspect of adult education & lifelong learning [https://link.springer.com/chapter/10.1007/978-3-031-14109-6\\_7](https://link.springer.com/chapter/10.1007/978-3-031-14109-6_7) compared to employability aspect (see also here overview of EU policies on youth, incl students - [https://link.springer.com/chapter/10.1007/978-3-031-14109-6\\_3](https://link.springer.com/chapter/10.1007/978-3-031-14109-6_3))
- [good overview of literature on institutional factors shaping participation in lifelong learning from comparative perspective is in Roosmaa 2022 <https://www.etera.ee/zoom/177850/view?page=1&p=separate>]

In the following sub-sections, we discuss in detail some of them.

### 1.2.1. 3-P Model of Student Learning at the Workplace (Päivi Tynjälä)

In her review study, Tynjälä (2013) presented a theoretical model on employees' learning at the workplace, based on Biggs' 3-P model of student learning (Biggs, 1999). In a more recent work Tynjälä et al. (2022a) modified the model for the context of students' learning at the workplace.

The three P's in the model refer to what Biggs (1999) originally called presage, process and product factors as main components of learning (Figure 1). In a learning environment consisting of school and workplace, there are three kinds of presage factors: those related to learner, those related to workplace and those related to the interface between workplace and school. As to the last-mentioned factors, the

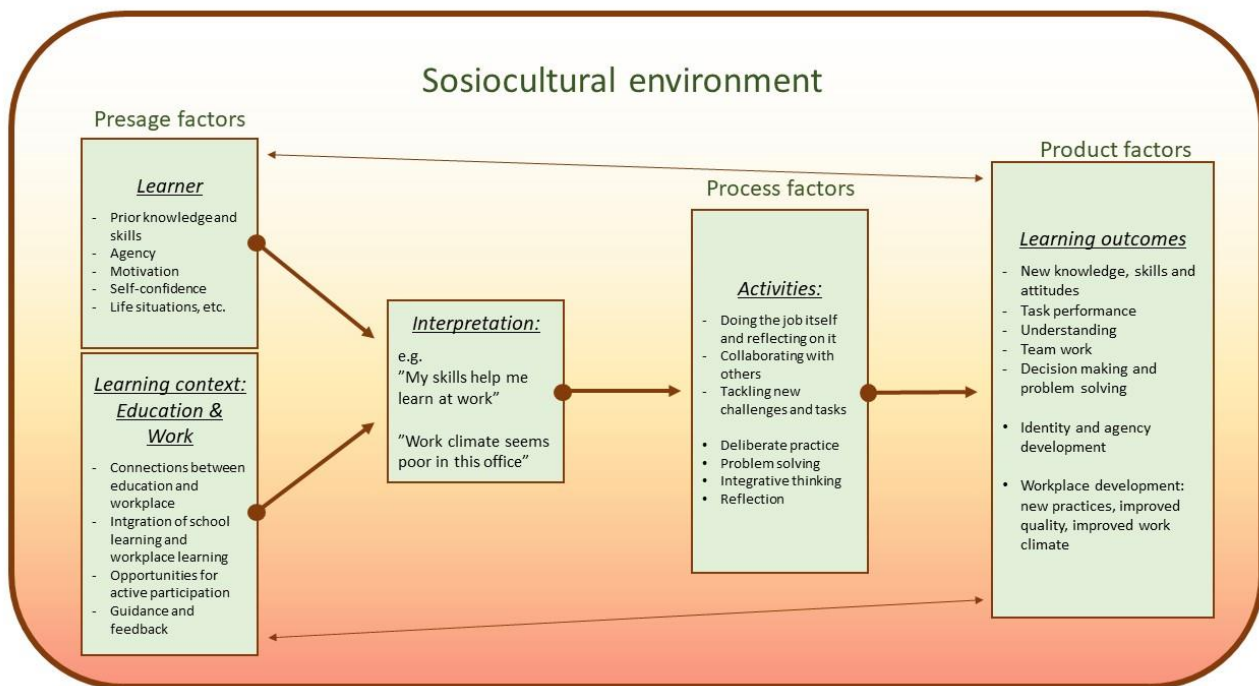


pedagogical practices related to connecting school learning and workplace learning are of special importance. All presage factors have an influence on the student’s learning processes, but the influence is not direct but mediated by the learner’s interpretation. The way how the learner sees her skills or motivation, for example, affects on her learning processes. Similarly, her perceptions of the learning contexts (in this case the school, the workplace, and their relationship) have an effect on how she approaches learning activities (processes). Further, product factors, that is, learning outcomes, are influenced by both presage and process factors. It is good to keep in mind that in addition to desired learning outcomes such as skills and knowledge, students may also learn bad practices or attitudes at the workplace (Virtanen et al., 2014). For this reason, it is important to discuss workplace practices at school.

In Figure 1, the arrows indicate that the influences between different components of learning are not only one-directional but bidirectional. For example, outcomes of learning processes may have an effect on presage factors such as learner’s self-confidence. The frame around the boxes of the ingredients of the three P’s represents the surrounding socio-cultural environment, including, for instance, different models on how work experience for students is organized, the ways how communities of practice (such as communities at workplaces and at school) function, and the way how education system and labour markets operate in society. All these socio-cultural factors also have an influence on schools and workplaces as learning environments.

The 3-P model of student learning at the workplace can be used as a framework for organizing learning environment for students in collaboration between education and work by providing a conceptual tool about the wide range of factors that need to be taken into account when planning work-related learning.

Figure 1. 3-P model of student learning at the workplace (Modified from Tynjälä, 2013; Tynjälä et al., 2022).



### **1.2.2. Models of the integration of work and learning as educational strategy (Päivi Tynjälä)**

At the beginning of the millennium, Guile and Griffiths (2001; see also Griffiths et al 2001) identified five different models on how students' work experience was organized: In the Traditional Model, collaboration and communication between the school and workplace was scarce, and students were just launched into the workplace. The Experiential Model stressed reflection on work experience and students' social development. The focus of the Generic Model was on students' learning outcomes, especially in generic skills. The Work Process Model aimed at developing students' holistic understanding of work processes and wider context. These four analytical models were based on observations on the European VET systems, whereas the fifth model, the Connective Model, was presented as an ideal new model. The main idea in this model is that education providers and workplaces collaborate to create learning environments where formal and informal learning are connected. The students are guided to reflexively make connections between school learning and workplace learning. Recently, connectivity between education and work has been further examined and elaborated (see e.g. edited books by Billett, 2015; Aprea et al., 2020; Kyndt et al., 2022).

Jääskelä et al. (2018) examined in Finland how higher education institutes have responded to the need of connecting education and work for developing students' generic working life skills. Four different models were identified: 1) Specialist Model where collaboration with workplaces are delegated to specialists; 2) Science-Based Renewal Model which emphasizes the role of universities as knowledge creators, and regards critically demands coming from the business world; 3) Project-Based Integrative Model aiming at the integration of theory and practice by using work-based projects as an instrument to connect education and work; and 4) Model of Networked Culture where higher education institutes and workplaces collaborate and create networked partnerships in order to educate skilful professionals and support workplace development. In the last model collaboration with workplaces is embedded in curricula and joint practices for merging research, teaching and regional development. Learning is seen as joint activity, involving not only students, but also teachers and work communities.

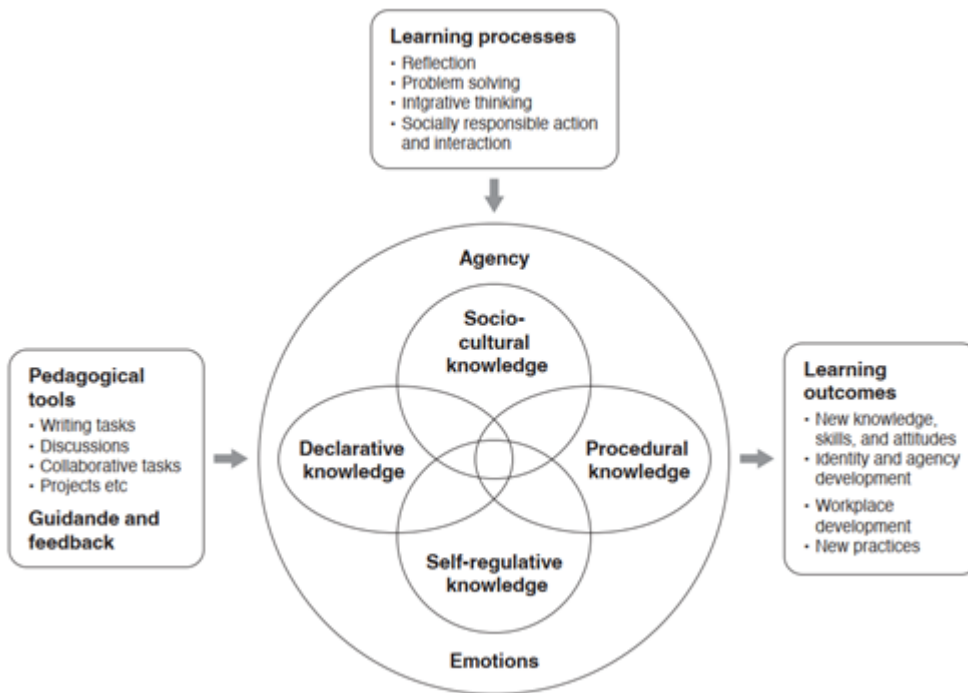
In Australia, several projects have been carried out to identify principles and practices for successful integration of practice-based experiences into study programmes in higher education (Billett, 2015). The studies revealed that workplace placement alone is not enough for securing graduates' smooth transition to working life and developing lifelong learning skills. It turned out that it is important to support learning processes with different pedagogical practices during work experience and also before entering and after leaving the workplace. Before the placement or project work students should be prepared for work requirements and encouraged for agency. During work experience, students need guidance and mentoring, and possibly peer communication and collaboration. Afterwards, it is useful to organize sessions where students can share their experiences and make connections between theoretical knowledge and what has been learned at the workplace.

### 1.2.3. Model of Integrative Pedagogy

One model designed for serving as a theoretical framework for supporting learning at the interface between education and work is called the Integrative Pedagogy model (IP model, e.g., Tynjälä, 2008; Tynjälä et al., 2016, 2022a). The model was originally based on studies of the components of professional expertise (e.g. Bereiter & Scardamalia, 1993; Bereiter, 2002, Eraut, 2004) integrative thinking (Kallio 2011, 2020), workplace learning (Billett, 2004; Malloch et al., 2011; Tynjälä, 2008) and the connective model of work experience (Guile & Griffiths, 2001; Griffiths & Guile, 2003). Studies of the role of emotions and agency at work (Eteläpelto et al 2013; Goeller & Paloniemi, 2017) and in educational settings (Jääskelä et al. 2017; 2020) have influenced the recent development of the model. The revised version of the Integrative Pedagogy model is presented in Figure 2.

The main principle of the Integrative Pedagogy is that *the main elements of expertise, that is, conceptual/theoretical, practical/experiential, self-regulative, and socio-cultural knowledge are deeply integrated in professional and occupational competence, and therefore it is important that educational practices support such integration and connection making between the different forms of expert knowledge* (Tynjälä, 2008; Tynjälä et al., 2022a; see also Elvira et al., 2017). Thus, the integration of work experience with theoretical studies and self-reflection has a central role in learning. The main point in this integration is that *the different forms of knowledge are not treated as separate from each other, but they will be connected and fused*. A variety of pedagogical methods can facilitate this connection making.

Figure 2. The model of Integrative Pedagogy (Modified from Tynjälä, 2008, Tynjälä et al., 2022 a,b).



*Pedagogical principles of the Integrative Pedagogy model*

Figure 2 illustrates the connection making between different forms of knowledge:

1) *Declarative knowledge* which can be described as *conceptual* or *theoretical* in nature. This form of knowledge is explicit in nature and can be expressed verbally or visually, and can be learnt by reading or listening, for example.

2) *Procedural, experiential or practical knowledge*, often called *know-how*. It is seldom learned from books (except manuals), and it manifests in skills. People acquire this kind of knowledge and skills from practical experiences. It may be explicit, but it also may remain implicit or tacit knowledge, as it is often based on non-verbal experience.

3) *Self-regulative knowledge* which includes metacognitive and reflective skills and knowledge, and is acquired through reflective activities.

4) *Socio-cultural knowledge*, embedded in social practices such as written or unwritten rules according to which things are done in certain workplaces or communities. This kind of knowledge can be accessed only by participating in communities of practice (Cairns, 2011; Wenger, 1998; Wenger et al., 2002). This is one reason why experience in authentic work environments is important for students.

Tynjälä et al. (2022a) stress that although different forms of knowledge have been analytically separated from each other, as done in Figure 2, in work activities they are deeply integrated and fused to each other. This fusion takes place when students apply theoretical knowledge in practical situations and, vice versa, explicate and reflect on their practical experiences with the help of theoretical knowledge. Thus, the first pedagogical principle of the IP model is: *Facilitate students to integrate different forms of knowledge*.

The box on the left in Figure 2 presents examples of pedagogical methods that can be used for facilitating learners in integrating knowledge (discussions, writing, collaboration, projects etc). Here pedagogical support, guidance and feedback, is important. The younger the students are the more important guidance is. Therefore, Tynjälä et al. (2022a) present as the second tenet of the IP model the following principle: *Ensure students get enough constructive feedback and guidance*.

Social practices vary between different contexts, including workplaces. For this reason, students should have opportunities to visit more than one workplace during their studies, at least in VET and HE levels. Students' learning experiences can also vary substantially between different workplaces, and therefore sharing and reflecting on differing workplace practices (socio-cultural knowledge) in the light of theoretical knowledge is important (see Billett, 2015, p. 215).

The role of emotions in learning has been emphasised in recent research both in educational and work contexts (see, e.g. Aarto-Pesonen & Tynjälä, 2017; Arpiainen et al., 2013; Ashkanasy, 2015; Eteläpelto et al., 2018; Hökkä et al., 2017, 2019; Ketonen et al., 2018; Pekrun & Linnenbrink-Garcia, 2014; Talvio & Lonka, 2021). For example, a study based on the IP model in an entrepreneurship course found that it is important to deal with students' emotions in learning environments where more active input from students is required than usually in their studies (Täks et al., 2014). It has been also found that during internships students often experience emotional challenges such as anxiety of low self-confidence (Billett, 2015, p. 153). Thus, Täks et al. (2014, p. 589) recommend discussing anticipated challenges of work experience with students in advance and providing them with support channels during their internships or work-based projects. Reflection of emotions in work-related learning is

important also afterwards. For these reasons, the third principle of the IP model focuses on emotions: *Help students understand that learning naturally involves different kinds of emotions, and give them opportunities to share their emotional experiences with teachers and/or peers.* (Tynjälä et al., 2022a.)

Research on individuals' agency has expanded recently both in the context of workplace learning (e.g. Billett, 2008, 2011; Eteläpelto et al., 2013, 2014; Goller & Paloniemi, 2017) and student learning (Jääskelä et al., 2017, 2020a, 2020b; Lipponen & Kumpulainen, 2011).

The IP model also stresses the role of student agency in learning processes. In workplace context, agency is understood as individuals' or communities' possibility to influence and make choices, develop their work, and negotiate their professional identity (Eteläpelto et al., 2013; Vähäsantanen et al., 2019). Similarly, in educational contexts agency is seen to consist of individual factors (e.g. self-efficacy, motivation, and participation activity), contextual factors (e.g. opportunities to influence and make choices), and relational factors (e.g. teacher support, peer support and trust) (Jääskelä et al., 2017, 2020a,b). Student-centered teaching emphasising active learning has proven to be associated with student agency (Jääskelä et al., 2017, 2020a,b) and the development of generic skills (Kember, Leung & Ma, 2007; Virtanen & Tynjälä, 2019). In a study by Virtanen et al. (2014), students' opportunity to act as an active member of the work community was a factor that explained most vocational students' self-reported learning during their work placement. Based on these findings, Tynjälä et al. (2022a) formulate the fourth principle of integrative pedagogy as follows: *Support the development of active agency in students.*

It is important to note that supporting active agency in students does not mean that they are left alone to develop their initiative, self-confidence and active participation. In contrast, as mentioned earlier, the IP model emphasizes the importance of pedagogical support, guidance and feedback. According to Tynjälä et al. (2022a) careful balancing between support and self-regulated action is needed. Especially in early phases of any learning processes and new experiences (including work-related learning) students usually need more guidance, whereas along with their development it is possible to gradually decrease pedagogical support.

According to Tynjälä et al. (2022a) main cognitive and social learning processes contributing to integration and connection making between different forms of knowledge include: 1) *problem solving*, 2) *integrative thinking*, and 3) *socially responsible ethical action and interaction*. Problem solving has been recognized as a main activity in expertise (Bereiter & Scardamalia, 1993), and the IP model presents problem solving where conceptual and experiential knowledge are fused as the key process of learning. When theoretical knowledge is used for practical problem solving it converts into skills, whereas it converts into informal knowledge when used for problems of understanding (Bereiter & Scardamalia, 1993, p. 66; see also Ericson, 2006, p. 694). This process also involves integrative thinking, that is, kind of thinking where an individual integrates and makes connections between different perspectives or ideas, and in this way develops new ideas. The IP model suggests using reflective journals, analytic writing, discussions, and group work, for example, as pedagogical tools for integrative thinking. Problem solving and integrative thinking may often involve ethical aspects, and therefore the third learning process of the IP model is defined as socially responsible ethical action and interaction. In practice, this means that students' work-related learning includes learning tasks

which require ethical reflection and action. Heikkinen, Tynjälä and Kiviniemi (2011) have given an example in teacher education. Before teaching practicum, student teachers examined ethical theories, and during their practice in the classroom they were guided to identify an ethical dilemma in teachers' work and reflect their experiences in the light of ethical theories in a reflective journal.

Thus, as the sixth principle of the IP model Tynjälä et al (2022a) present the following statement: *Make sure that the learning tasks for integrating different forms of knowledge involve students in problem solving, integrative thinking, and wise socially responsible ethical action and interaction.*

*What kind of learning outcomes the Integrative Pedagogy model produces?*

The use of the IP model has been empirically examined in several studies (e.g., Heikkinen et al., 2011; Koskinen & Äijö, 2013; Ortoleva & Bétrancourt, 2016; Tynjälä et al., 2016; Pekkarinen & Hirsto, 2016; Täks et al., 2014; see also Elvira et al., 2016, 2017 for pedagogical principles, and Tynjälä et al., 2014 for a framework for designing technologies for workplace learning). These empirical studies have indicated the feasibility of the model in terms of practical applicability and intended learning outcomes.

Empirical studies in education-work contexts both in VET and HE have supported the usefulness of the IP model in supporting work-related learning. For example, Virtanen et al. (2014) found that the integration of school learning and workplace learning was the second biggest factor explaining (self-perceived) learning outcomes during VET students' work experience. The closer this integration was perceived, the more students reported learning of a variety of skills and knowledge. In another study, by Täks et al. (2014), engineering students in an entrepreneurship course applying the IP model, it was found that self-reported learning outcomes varied from the development of self-directed learning and other generic skills to leadership skills and taking responsibility for the whole group achievement. In some studies students have reported things that are related to the development of professional identity (Heikkinen et al., 2011; Tynjälä et al. 2009) and increased motivation (Helle et al., 2007). Improvements in student motivation has also been reported by teachers and representatives of workplaces (Tynjälä et al., 2020). Business organizations also reported that their organizations benefit from student projects as they often produce new knowledge, services, practices, prototypes or products. They also found that internships help in recruiting new employees. It can be concluded that the outcomes of IP model go beyond learning of skills and knowledge; they also include professional identity development, and benefits for workplace development.

*The relationship between the 3-P Model and Integrative Pedagogy Model*

All of the pedagogical principles of the IP model quoted above (in more detail, see Tynjälä et al., 2022a) relate to the *process component* of the 3-P Model of Student Learning at the Workplace, thus highlighting the importance of support, guidance and facilitation of students' learning processes and the development of agency. When learning takes place both at school and at the workplace it is important to pay attention to the relationship of these two learning environments and make connections between them, so as to avoid the situation where school learning and work-related learning have nothing to do with each other. It is clear that teachers and schools cannot much influence on conditions

at the workplaces, and therefore it is important that schools and workplaces agree about pedagogical practices.

As to the *presage factors* of the 3-P Model, the IP model suggests that both learner-related factors and contextual factors should be taken into account when planning and providing pedagogical tools and pedagogical support presented in the IP-model. This means that learners on different stages of educational path might need different kinds of learning methods and different forms of guidance and support.

Regarding the *product component* of the 3-P Model, it is evident that the learning outcomes listed in Figure X vary depending on educational level. Younger students may learn some new skills and develop their understanding of work in general, whereas more advanced students in VET and HE may contribute to the development of new practices, services, or products. Probably all age groups may benefit of work-related learning in terms of identity and agency development.

#### **1.2.4. The widened-i-PPP Model of Professional Learning - from Gruber & Harteis (2018)**

Chapter from H. Gruber, C. Harteis, *Individual and Social Influences on Professional Learning*, Professional and Practice-based Learning 24, [https://doi.org/10.1007/978-3-319-97041-7\\_7](https://doi.org/10.1007/978-3-319-97041-7_7)

*i-PPP: A Model of Professional Learning*

##### *1. The General Picture: Adaptive Expertise*

The role of knowledge for expert performance rarely has been doubted, but the usage of the concept “knowledge” has undergone many developments and changes. The classical distinction is between declarative knowledge (know-that) and procedural knowledge (know-how). Theories of skill acquisition have described processes of knowledge restructuring that transform the first form of knowledge into the latter. Most prominent is the ACT\* theory which describes skill acquisition as compilation and proceduralisation of knowledge (Anderson 1982, 1983, 1987). Such theories take into account that knowledge is not merely a cognitive entity within the heads of individuals, although concepts of representation and recall of knowledge still are prevalent and suggest such an interpretation. Knowledge types which are related to expert performance usually require that the individual experience plays a crucial role in the definition of knowledge. In an attempt to classify types of knowledge, Raju et al. (1995) distinguish subjective knowledge, objective knowledge, and usage experience. Accordingly, Alexander (1996) calls theories that consider knowledge to be merely a cognitive, intraindividual entity, first-generation knowledge theories. Second-generation knowledge theories, in contrast, argue that knowledge gains its relevance only in connection with real actions and, thus, they represent an interaction of individual and situational components.

Hatano and Inagaki (1986) brought into discussion the notion of adaptive expertise, as opposed to routine expertise. Routine expertise results from proceduralisation as it is proposed in the ACT\* theory, whereas adaptive expertise denotes experts’ increasing flexibility to deal with changing situations and contexts. It is assumed that during the acquisition of expertise, routine expertise and adaptive expertise are continuous stages of development (Gruber et al. 2007). The mastery of routines seems to be required in order to be able to develop adaptive expertise. Hatano and Inagaki (1992) assume that



experts' ability to apply their knowledge in a wide variety of situations is result of a deliberate process of de-situationalisation. The continuing experience with domain-specific situations and the deliberate reflection leads to the construction of mental models, which are, like schemas, generalised representations of knowledge, similar to encapsulated knowledge (Schmidt et al. 1990, 1992).

Lin et al. (2007), in their tribute to Hatano after his passing, describe how Hatano developed the concept of adaptive expertise in his analyses of the nature of the performance of abacus masters. Abacus masters, he said, should be considered to be routine experts, because they have developed an outstanding but narrow sort of expertise. In contrast, adaptive experts excel by “performing procedural skills efficiently, but also understanding the meaning and nature of their object” (Hatano and Inagaki 1986, p. 262). The qualities of adaptive expertise that distinguish it from routine expertise include the abilities to verbalise the principles underlying one's skills, to judge conventional and nonconventional versions of skills, and to modify or invent skills when necessary. Hatano and Inagaki (1986) proposed a number of concepts that inspire learning activities which foster the growth of adaptive expertise. First, the variability of professional situations encountered plays a role; to put it pithily, educators' attempts to reduce variability during learning in order to facilitate the learners' tasks might seriously impede learning of adaptive skills. Second, there is substantial interindividual difference in the motivation and volition of individuals to seek for ambiguity. The degree of tolerance of ambiguity is closely related to the degree to which complex learning environments are creatively explored. Educators probably do often produce counter-productive outcomes when they try to make learning situations transparent and easy to understand. “When a procedural skill is performed primarily to obtain rewards, people are reluctant to risk varying the skills, since they believe safety lies in relying on the ‘conventional’ version” (Hatano and Inagaki 1986, p. 269). Taken together, it seems to be educationally relevant in how far risk-taking and attempts to foster understanding are addressed. “A culture, where understanding the system is the goal, encourages individuals in it to engage in active experimentation. That is, they are invited to try new versions of the procedural skill, even at the cost of efficiency” (Hatano and Inagaki 1986, p. 270).

In accordance with research on expertise, Hatano and Inagaki (1986) argue that adaptive expertise is domain-dependent because it develops by accumulated experience with domain-specific tasks. Changes in work-related task requirements therefore play an important role in provoking the growth of adaptive expertise (Griffin and Hesketh 2003; Joung et al. 2006; Neal et al. 2006), when the professionals' knowledge has to include information of why and under which conditions certain methods have to be used or new methods have to be devised.

The importance of a distinction between adaptive experts and routine experts in maintaining high performance is particularly visible when working conditions change. Obviously, many professions change a lot within relatively short periods of time. This addresses important issues for research on expertise, namely, the roles of domain specificity and of flexibility for expert performance. Under changing professional contexts and situations, it is far from trivial to explain why (some) experts still are able to decide when to apply routines or when to rethink the given task. Hatano and Inagaki (1986) were among the first to express the challenge to understand when and how experts leave routines and respond adaptively and flexibly when changed situations require it. Subsequent models of expertise development took this into account and proposed processes that integrate routine and adaptive action. One example is Schmidt's and Boshuizen's theory of knowledge encapsulation, whose central component is a process of knowledge restructuring when a certain multitude and variety of domain-specific information is encountered. Nonetheless the topic of adaptive expertise or of maintenance of experts' high performance under changing professional conditions still offers many challenges. Bohle Carbonell et al. (2014) provided a review of work-related aspects of adaptive expertise.



It is still an open question under which conditions experts deliberately decide not to apply routines but rather to initiate adaptive problem-solving processes. The development of adaptive expertise is a result of intraindividual differentiation by deliberate reflection of professional experiences.

Obviously, it is an educational challenge to explore more generally the mechanisms that foster or impede the adaptiveness of professionals. Adaptiveness, flexibility and inventiveness are based on the availability of abounding conceptual and procedural knowledge. "Flexibility and adaptability seem to be possible only when there is some corresponding conceptual knowledge to give meaning to each step of the skill and provide criteria for selection among possible alternatives for each step within the procedure" (Hatano 1982, p. 15). Such conceptual knowledge enables experts to construct mental models of complex systems (Mandl et al. 1995), which can be used in mental simulations. In turn, the use of mental simulations contributes to the development of deeper conceptual understanding of the domain. Reflection is the key mechanism underlying deep elaboration in order to work out why a skill works or why each step is needed during knowledge application.

Hatano and Inagaki (1992) analysed how the growth of adaptive expertise can be instructionally fostered. They identified four conditions (Lin et al. 2007): (a) regularly encountering novel problems to which prior knowledge is not readily applicable or encountering experiences that disconfirm expectations; (b) regularly engaging in critical discussions about one's own performance, for example, fostered in feedback and supervision; (c) being free from urgent external need like rewards or positive evaluations, and thus able to pursue comprehension even when it is time consuming; and (d) being surrounded by reference group members who value understanding. It is an instructional challenge to provide learners with situations that best possibly fulfil these conditions.

A similar distinction as Hatano and Inagaki's distinction of adaptive expertise and routine expertise is the one between generic expertise and specific expertise that was proposed by Patel and colleagues (Groen and Patel 1988; Patel and Groen 1991; Patel et al. 1986) in medical domains. Generic expertise denotes the construction of declarative knowledge representations, while specific expertise indicates the availability of adequate actions and procedures in typical professional situations. As with adaptive expertise, the more advanced forms of expertise result from elaborations and experiences made from professional learning, but they require that all relevant declarative knowledge is readily available. Hence, specific expertise can only emerge when generic expertise has been acquired before. In an extension of the ACT\* theory, Patel and Groen (1991) distinguish four stages: beginner, intermediate, generic expert, and (specific) expert. The first two stages are analogous to the declarative stage and the procedural stage in the ACT\* theory. Generic experts in addition have domain-specific schemas available, whereas specific experts are characterised by the availability of illness scripts.

It has been argued that the most distinctive characteristic of adaptive expertise is to be able to efficiently solve previously encountered tasks and to generate new procedures for new tasks. However, it is arguable in how far adaptation to completely novel situations happens within professions. It is interesting, however, to understand whether different types of learning trajectories are used when experts have to break free from routines. There is not, however, a true dichotomy between adaptive and classic expertise. Expertise rather should be considered as a continuum of adaptive ability, with the ends of routine skills and innovative competence.

A distinguishing feature of adaptive expertise is the ability to apply knowledge effectively to novel problems or atypical cases in a domain. Holyoak (1991) focussed on the capability of drawing on the knowledge to invent new procedures for solving unique or fresh problems, rather than simply applying already mastered procedures. Adaptability allows experts to recognise when highly practised rules and

principles do not apply in certain situations in which other solvers might typically attempt to use a previously learned procedure.

Martin et al. (2005) addressed the challenges related with the goal to education- ally support the development of adaptive expertise. In the domain of biomedical engineering ethics, they argue, the development of adaptive expertise is most important, because the regulations and knowledge base in this discipline undergo dramatic changes within relatively short periods of time so that professionals have to adapt several times during their careers. They have to be able to use their knowl- edge and experience to learn in unanticipated situations. Schwartz et al. (2005) suggested two possible trajectories to adaptive expertise, either (a) innovate and then become efficient or (b) become efficient and then practise innovating. In several studies of instructional interventions, they demonstrated that trajectory (a), innova- tion to efficiency, seems to be more promising. Based on their findings, they sug- gested that before learning procedures for solving problems, students should first be given the opportunity to innovate and attempt to discover solutions to novel problems without instruction. Following this practice with innovation, students can then benefit from routine practice, with less risk of becoming a routine expert or simply a frustrated novice.

Mandl et al. (1996a) argued that the training of flexibility is important to over- come the problem of inert knowledge. Related to real-life professional practice, they in particular referred to the random-access instruction approach which stresses the necessity of acquiring flexibly applicable competence in complex domains (Spiro et al. 1991). This approach is particularly addressing the advanced construc- tion of knowledge within ill-structured knowledge domains like medicine. These domains can be described by two basic characteristics, complexity of concepts and cases and irregularity of cases with large variability of relevant features across different cases. Authentic contexts in learning are used to avoid the development of over-simplified concepts that may lead to incorrect applications. Another central concept is the use of multiple perspectives during learning. The learner should view the same subject matter at different times, in different contexts, and for different purposes to systematically enlarge the range of application of knowledge. *Reformpädagogik* ideas of authentic contexts and different directions of view are most important in random-access instruction. A preferable means for realising those concepts is the use of computer-based training. Spiro et al. (1991) plead for the use of the “landscape criss-crossing” technique, which denotes the traversal of complex subject matter by returning to the same place of the conceptual “landscape” on different occasions and from different directions.

Gruber et al. (1995) stress the feature that situated learning approaches model learning as an active, constructive process. To make knowledge applicable outside the learning situation, therefore, requires the acquisition of knowledge that can be applied in many different situations. One instructional means to reach this goal is to confront the learner with a variety of situations in which the respective knowledge shows to be relevant. To confront learners with problems from multiple perspectives can increase the probability that their knowledge can be applied in multiple con- texts. Instruction following the theory of cognitive flexibility aims to induce multi- ple and, as a consequence, flexible representations of the knowledge which can be applied for problem-solving in a great many of contexts. An instructional means to induce flexible multiple representations is to elucidate the same concept at different times, in different contexts, with different problem-solving goals, and from different perspectives. It is this repeated elucidation that allows the learner to create a rich collection of aspects on the same concept which helps him or her to apply the knowledge in many different situations. Furthermore, this kind of instruction ren- ders it possible to identify multiple relations to other concepts as well as common misconceptions and oversimplifications. To sum up, transferability

of knowledge increases by multiple perspectives on the problem rather than by abstract context-free learning.

Cognitive flexibility is then viewed as the ability to construct knowledge representations from different elements resulting in broad applicability of knowledge. In particular, cognitive flexibility is indispensable in ill-structured domains in which no distinguished schemata exist having enough complexity to deal with a variety of real-life problems. Representations which consist of multiple relations and integrate multiple perspectives provide a good basis for coherent representations of complex subject matters so that they can be successfully applied.

## 2 *From the 3-P Model of Learning to the 3-P Model of Workplace Learning*

When introducing the core issues of this book, it was claimed that it is a challenge for research to provide the basis for adequately supporting the acquisition of expertise. Using the concept of learning poses many particular and difficult questions, when learning is analysed from the perspective of reaching a level of expert performance. Nevertheless, it is helpful to study general frameworks of learning research in order to understand what can be transferred to the acquisition of expertise and which components specifically have to be added.

An important step towards an adequate understanding of professional learning was undertaken by Tynjälä (2013) who extended Biggs' general 3-P model of learning (1999) and enunciated her 3-P model of workplace learning.

In this model, Tynjälä (2013) takes into account what sorts of learning experts undertake. Her framework takes the professional context into account. Hence, she takes a perspective that is similar to that taken in this book. Researchers in learning and instruction try to understand the emergence (and maintenance) of interindividual differences in performance. Professionals in the fields as well as employees and unions seek for possibilities to support humans in their attempts to enhance their professional performance. It is noteworthy that such an enhancement sometimes does include attempts to prevent others to perform on a high level, for example, in team sport competitions or in attempts to gain market control. The society in general wants to know why some groupings of individuals work better or worse than others, how a high level of performance can be maintained in older age, and how demographic developments affect the general level of performance.

Although the excellent performer is considered as outstanding by all these observers, it has become obvious that a high level of professional performance is not the terminal point of a professional development process. Rather it is an interim shape in a lifelong process. Even world-beating tennis champions quickly forfeit their top position when they do not practise for a couple of weeks. Engineers and medical doctors in high-level hospitals lose their excellence when they do not keep track with most recent developments in their fields. Leaders of successful teams go wrong when they discontinue looking for further improvement in the composition of their teams and in the team's performance.

Maintaining one's level of professional performance requires reflective analysis of one's activities and one's experiences and a deliberate understanding of future development. Hence, "learning" is a crucial component of professional performance, although the concept of "learning" may be quite different from the concept used to describe "school learning" or "vocational learning". Learning is an integral part of working and performance, and thus learning often is implicit. Other persons may guide or direct such learning, but they often act informally, stay invisible, or do not even understand themselves as teachers. The proportions are fuzzy to which daily activities can be split into "working"

and “learning”. Often, excellent performers continue to profit from their specific experiences, because they meet situations and learning opportunities which are unavailable for average mortals. (Only few football players have the opportunity to learn from the experiences made while playing in the finale of the World Championship.) Sometimes, new aspects of performance explicitly have to be acquired, and explicit training periods can be found. In such cases, learning seems to dominate against working, although there are clear work-related purposes of the learning activities. Learning at a high professional level then is identical with learning during professional development and expertise acquisition. For example, researchers entering a new research area can make use of their research and methodology skills but still have to work hard to master the state of the art in the new field. Sometimes, learning is facilitated or hindered by basic information-processing properties of the learning individual. Think of an elder adult who has to memorise huge amounts of new information, as it sometimes happens in IT-driven workplaces. Understanding such sorts of professional learning resembles understanding initial learning processes typical for a newcomer in a domain.

So, do high performers at all differ from other individuals in learning? Yes and no. Sometimes they do, and sometimes they do not. The difference between them is that the experts have available a much greater plenitude of learning activities, all of which are usefully embedded in their professional practice. As Ericsson and Lehmann (1996) put it, the main characteristic of experts is their tremendous adaptation to the requirements of the domain. It is this flexibility which characterises experts: sometimes (often!), they learn in passing while working; sometimes, they have to deliberately practise in order to enhance their skills; and sometimes, they have to learn from scratch, and the learning outcome depends on general premises like intelligence or working conditions. Experts often deliberately choose one of these perspectives, and making such choices in a successful manner is part of their expertise. What might resemble an eclectic procedure usually is well designed; therefore, it is adaptive and deliberate rather than eclectic.

A general framework of research on learning like the 3-P model of learning (Biggs 1999) cannot take all these ideas into account. In her review of research on workplace learning, Tynjälä (2013) therefore suggested to adopt Biggs’ (1999) 3-P model of school learning to the field of workplace learning. Biggs (1999) differentiated three basic components of learning, each characterised by a “P” concept, thus forming a “3-P model”: presage, process, and product. Presage included both student factors (prior knowledge, ability, motivation) and the teaching context (objectives, assessment, climate/ethos, teaching, institutional practice). The process component describes learning-focussed activities, which can be appropriate or inappropriate, deep or on a surface level. The product component includes all sorts of relevant learning outcomes.

In her adaptation of Biggs’ model, Tynjälä (2013) differentiated the components according to the requirements of workplace learning, and she deliberately put the whole 3-P model within an all-embracing frame, called “sociocultural environment”, which comprises the aspects of models of work experience, of communities or practice, and of organisational learning. This frame enables her to put more emphasis of the learning context as important part of the presage component. Presage comprises both learner factors and learning context – those two parts are connected via interpretation processes. The term “learner” indicates that not only students are part of workplace learning processes but adults as well. Many of the learning takes place in an informal way, often outside educational or pedagogical institutions. Hence, Tynjälä replaced Biggs’ concept of “teacher context” by her concept of “learning context”. In a similar manner, the process component within the 3-P model of workplace learning does not only comprise learning-focused activities, but all activities – which may be intentional or unintentional – that are related to work experiences. Other persons may be included both

in the process component (e.g. collaboration) and in the product component (e.g. improved work climate).

- The adaptation of the 3-P model of learning as done in the 3-P model of work- place learning, thus, is based on a number of modifications.
- Emphasis on the context of learning (e.g. by referring to the sociocultural environment or by taking into consideration the technical-organisational environment)
- Addition of an additional factor between the presage and the process components, namely, the learner's interpretation of presage factors (which is important as many processes of workplace learning are unintentional and are not guided by educational or pedagogical professionals in learning institutions)
- Adaptation of the contents of the three components and the titles for the factors included in the model (e.g. learning context instead of teaching context; learner factors instead of student factors)
- Diversification of potential learning outcomes

Tynjälä (2013), thus, puts much stress on the social environment in which learning is contextualised during workplace learning. Many of the issues addressed in this book, thus, are covered by her 3-P model of workplace learning. In order to move forward from the model of workplace learning towards a model of professional learning and of the support of the acquisition of expertise, both the individual and the social aspects of learning have to be analysed as equivalent parts of a general process. Hence, in the following, a further extension of the 3-P model of work- place learning into the i-PPP model is proposed in which both the development of intraindividual structures and processes and of social relations is considered as equivalent research subject matter.

### 3 The i-PPP Model

In the “domain of professional learning”, different perspectives are appropriate to describe, explain, and predict expert performance, depending on the respective research focus: It may be appropriate for research on professional learning to study the experts' current performance and their attempts to maintain their level of performance. It may be equally appropriate, however, to study how experts acquire new skills, how they make use of new tools, etc. And, finally, it may be equally appropriate to study completely new avenues how experts try to master their professional challenges. In each of these cases, very different research strategies may be most appropriate.

We, thus, propose a model of professional learning which separates three very different kinds of learning processes: initial learning (mainly influenced by premises of learning like intelligence or working conditions), professional and expertise development (mainly considering of deliberate practice, knowledge restructuring, refinement of procedures, and the growth of professional communities and social networks), and casual learning as part and for the sake of professional work (aiming at maintenance of the performance and its strategic extension).

In adapting Tynjälä's 3-P model of workplace learning (2013) to expert performance and professional learning, we maintain the distinction of the three P components, although we rebaptise the first one “Premise” rather than “Presage”. This denomination indicates that we conceive the P components slightly differently than Tynjälä (2013):

- All components are considered *simultaneous* facets of professional learning, indicating to which degree the current learning activity is related to the professional work performance.
- All relations between the components are considered to be *mutual* rather than unidirectional.



- All components inherently comprise both *individual and social* aspects of learning.

These differences express that in our model the reference point for differentiation of learning components is the professional performance or experts. Professional learning from the perspective of an expert is related to the current performance and its maintenance and extension. Such professional learning sometimes is part of ongoing professional work, sometimes it aims at specific explicit learning activities, and sometimes it focusses on completely new fields of interest. We suggest that research of professional learning should always relate the learning under investigation to the level of professional performance in a similar way. It should interpret professional learning as a part of professional performance, aiming at its maintenance and extension. Even if new initial learning is considered, the boundaries of such learning rarely are mystical or hidden learner factors or learning contexts but rather logical premises of learning possibilities.

“Product” in our model refers to professional learning at the professional performance level, aiming at the maintenance of the position of excellence. “Process” in our model refers to professional learning at the professional development level, aiming at deliberate practice and at the restructuring of knowledge and of skills in order to master the transition towards the position of excellence. “Premise” in our model refers to professional learning at an initial level, aiming at a level from which the transition towards the position of excellence can be undertaken.

A second difference between our model and Tynjälä’s 3-P model of workplace learning (2013) is that we explicitly include – and separate! – individual and social parts in each of the components, and we do so in an integrated model, thus the extension “i-” in the label “i-PPP model”. While in the premise component both parts easily can be analysed separately, they are more complexly related in the process component and in the product component. Research on individual and social aspects of the premise component usually is unrelated. Research on processes of professional development investigates how systematic individual learning is changed and how cognitive representations are transformed by experience in professional contexts. Such research tries to extend our understanding how individuals, on their way to expertise, adapt to the task requirements defined by others in the domain. Only rarely is the development of the individual and of the social context simultaneously investigated. Research on the product of professional performance regards the expert as a central part of his or her own social and cultural context, which shape each other mutually. The expert is a player in the game who partly defines the rules of the game.

The social, or sociocultural, environment, thus, is not conceived as a framework within which professional learning takes place but rather as an integral part of professional learning, which is more or less explicitly addressed when individual learning is studied.

It is worth to spend a few paragraphs to explain why we conclude from our analyses of the state of the art exactly the i-PPP model of professional learning and not a different one. This conclusion is firstly based on a re-evaluation of the role of the social context within research on expertise and professional development. Secondly, the 3-P structure and the embedding in the “atmospheres” of the internal world and of the external world help to sharpen the view on professional learning by focussing on professional performance as a whole, as a holistic entity. We prefer to give priority to the analysis of professional performance – both in its successful and in its failing varieties – rather than to particular theoretical constructs. We do so in order to avoid the trap that the framework suggests refinements of the underlying theoretical components rather the increasingly deeper understanding of the interesting phenomenon of professional performance.

### *Explanation 1: Why Do We Suggest This Model?*

Professional learning links the individual acquisition and restructuring of domain-specific knowledge on the one hand and the social embedding within communities of practice on the other hand. During vocational apprenticeship, apprentices experience vocational school and inner-firm instruction in parallel and have to integrate their knowledge and skills acquired in both settings. The relation between individual and sociocultural processes is being continued over the whole span of professional careers: Employees bring their experience into formal training settings, and they transfer training contents into their work life. Empirical research acknowledges the importance of such an integration of formal and situated learning (Billett et al. 2008).

Obviously, the success of such learning is influenced by both individual constraints and affordances (e.g. intelligence, processing speed) and social constraints and affordances (e.g. team learning, working conditions). The interplay of individual and social components on this basic level of constraints and affordances does not match the interplay of individual and social components as described in the previous paragraph, however. The increasing participation in communities of practice requires advancements both in intraindividual cognitive capabilities and in social capabilities, and the same applies for refined processes of knowledge restructuring.

The picture gets even more intricate if we take into consideration that experts' professional performance does both react on the sociocultural environment and shape it. In professional performance, a distinction of both components even seems to be inadequate.

The relation between individual and social components of professional learning is versatile. In this final chapter, we tried to conclude what we found in our analysis of the literature on professional learning, and we suggested our model to serve as a framework for reviewing research and for identifying research gaps and research desiderata. Both the differently complex phases of professional performance and of the interplay of individual and social aspects of professional learning have to be taken into account.

Such a model should consider insights of recent research on experts' excellent performance in professional domains. The ways of thinking about professional expertise has dramatically changed in recent years. A few decades ago, professional performance was considered to be only based on the amount and quality of specific knowledge a person had accumulated during professional life. This view was replaced by a perspective differentiating dimensions of knowledge and professional performance. It was plead to integrate both individual cognitive aspects and social and cultural dimensions of growing into a community of experts (Billett 2001c). Individual cognitive processes like acquisition, storage, and retrieval of knowledge in memory systems are represented by research on expertise, whereas sociocultural theories of professional development highlight processes of increasingly becoming integrated in communities of experts and acquiring practicable knowledge by directly participating in professional practice.

Research on individual cognitive components of expertise generated evidence for the essential of academic, declarative knowledge, whereas sociocultural research focussed on practice-related knowledge, caring little about abstract, context-free knowledge. To carry both approaches to extremes, two misleading assumptions arise, which are often discussed in instructional design debates of vocational trainings. These misconceptions reflect the misassumptions mentioned above about incongruence of formal and situated learning. Both reflect misconceptions that result from wrongly assumed generalisation of theoretical frameworks that are applied in the analysis of professional performance. They give priority to a theoretical construct rather than to the empirical phenomenon.

*Misconception 1* Huge amounts of academic knowledge lead to professional competence. Watching at primarily theoretical curricula of vocational apprenticeships and trainings, the idea might develop that a huge amount of abstract knowledge leads to professional competence. However, recent educational studies showed that providing learners with much declarative knowledge often leads to inert knowledge rather than to expert performance. Evidence exists in the field of commercial vocational training or of higher education that academic knowledge acquired during learning could not easily be transferred to daily life problems (Mandl et al. 1996b). Similar findings were received in the domains of teaching, medicine, and others. The impact of academic knowledge in the domain of counselling is supposed to be limited as well. After theoretical trainings in artificial environments, counsellors often fall back on their subjective theories and routines. Hence, despite of much evidence of the huge impact of declarative knowledge for expertise development, academic knowledge seems to be a necessary component of expertise, but not a sufficient one. It is a fallacy to equate “expert knowledge” and “declarative, academic domain knowledge”. As was mentioned above, expertise comprises more than only acquisition of declarative knowledge and automatization of routine actions. Experts in addition excel by flexibility of actions (“adaptive expertise”; Hatano and Inagaki 1986).

*Misconception 2* Huge amounts of practical knowledge lead to skill formation. The gap between theory and practice is frequently found in complex domains. Practitioners claim that workaday knowledge, common sense, and social competences are sufficient for skilful performance. It is argued that concepts of theoretical instructions show deficiencies. Current German discussions about leading back teacher education from university to practical vocational training institutions indicate the trend to dramatically reduce theoretical and academic parts of vocational training. However, practice without theoretical reflection does not cause deep learning processes. Declarative knowledge is essential to evaluate the quality of practice, to review problems and solutions, and to implement innovations. If it is true that practice shows unique characteristics in particular respective sociocultural contexts, then abstract knowledge is the more essential for flexibly applying various concepts for different categories of practical problems.

Like academic knowledge, practical knowledge seems to be a necessary component of expertise, but not a sufficient one. In recent theories of expertise development, thus, it is tried to combine both aspects by introducing experience as essential knowledge. Experience is defined as episodic knowledge about how, when, and in which situation to successfully apply knowledge. In other words, such theories argue that the combination of both formal and situated learning is crucial. Expertise development does not only include accumulation of declarative and procedural knowledge but also processes of reorganising existing knowledge according to specific situations and to constraints set by the social community of experts in the domain. The main educational issue then is to generate experience-based knowledge structures, which show high subjective relevance and personal importance related to the experienced practice within relevant social contexts. Concluding, the “right” experience provides a basis to combine academic and practical knowledge for expertise development and skill formation. It requires the development of learning environments which fosters both individual cognitive components of expertise – formal learning processes might be appropriate to foster such processes – and sociocultural assimilation and accommodation processes, preferably fostered by ideas how to initiate situated learning. Professional experience in the above-mentioned sense increases episodic knowledge and thus contributes to the successful, flexible, and innovative use of declarative knowledge as well as to the mastery of specific practical situations.



### *Explanation 2: Why Do We Not Suggest a Different Model?*

In the argumentation above, we declined the possibility to develop separate concepts of formal versus informal learning settings on the one hand and academic versus practical knowledge on the other hand. Hence, it was tempting to refer to a framework which differentiates levels of individual, respectively, social influences:

- Individual influence
  - Micro level: cognition, emotion, and motivation
  - Meso-level: family, peers, friends, and occupation
  - Macro level: societal position, education, and ethnic background
- Social influence
  - Micro level: workplace and team
  - Meso-level: company
  - Macro level: labour market and competition

It is the grain size of analysis that separates the parts of this framework. This leads to the selection of different research foci, of different samples of professionals, of different task that are to be performed. Although each perspective has its own merits, and although they clearly resemble the PPP components of our model, there are important differences. The underlying rationale is opposite: While in our model, the invariant is the professional performance, and the appropriateness of particular scientific approaches is questioned, in this alternative the invariant is the differentiated grain size of analysis, and it is under question whether (at least parts of) professional performance can be appropriately explained by them.

From a micro-perspective, individual influences comprise cognitions, emotions, and motivation, whereas environmental influences refer to the workplace environment and the team in which professionals are embedded. It was already commented that all workplaces are socially embedded (not even “lonely professions” make an exception, as Hespø 2013, showed in his ethnographic study of offshore crane operators working on oil installations in the North Sea). From a meso-perspective, family and friends, peers and the occupation of a professional are to be considered as individual influences on professional learning, while the company is an environmental influence. Finally, from a macro-perspective, the societal position of the professional influences professional learning opportunities, and labour market situation with its competition for the professional is to be considered. The most influential recent educational efforts on a macro-perspective are the OECD projects. The OECD investigates on various educational levels (e.g. secondary school level, PISA; higher education and adult learning, TALIS) the determining role of social origin for later success firstly within the educational system and secondly within the employment system. The extent of the influence of the social origin varies across different countries (unfortunately, we have to acknowledge that social origin is clearly important in Germany), but there seems to be a mainstream to observe that the gap becomes larger between disadvantaged people with precarious socio-economic status and successful people from educated classes and wealthy people. One consequence to expect from this development is that individuals within the employment system feature different socio-economic and educational backgrounds; the workforce, hence, will become diverse and heterogeneous.

## *How to Use the i-PPP Model of Professional Learning for Designing Future Research*

The model of individual and social influences on professional learning is aimed to help to find answers to the research challenges posed in the beginning of this book. Hence, it opens avenues for future research on professional learning. A few examples may serve as illustration on how to use the model for designing future research. Parts of the proposed research ideas can already be found in research about the support of the acquisition of expertise and its maintenance. However, they have not yet systematically been implemented and investigated.

- Rethink errors; obviously, errors are the most important issue for experts to consider: Experts excel in their performance, and they are most interested to learn about cases when they do not excel; see the complete video analyses of sport performance, and the attention given to actions which did not work appropriately and as predicted; there is no false shame when errors occur; there is no accusation when errors occur; it just piques one's curiosity
- Fostering advanced knowledge acquisition, e.g. by landscape criss-crossing, multiple perspectives, and interdisciplinary work
- Challenging in how far experts may (and should) serve as models for novice learning
- Rethink motivation; it is idle to think about experts in traditional concepts of motivation, because experts do not have to be motivated, not even when most strenuous deliberate practice is to be done – practising is part of their “life”; but what then does the distinction mean between intrinsic motivation and extrinsic motivation?
- Rethink the concepts “individual” and “social”; they often are not different in the eyes of experts
- Rethink metacognition: Experts do not have to be able to take a meta-position or to cogitate about their own cognitions; monitoring their own action is natural part of their normal daily performance; hence, there is no closed-loop regulation system which has to be followed per se
- What makes an expert doubt about his or her own performance? When does she or he decide to interrupt and to move their focus from the P3 level (product) towards the P2 level (process) or even towards the P1 level (premise)? It obviously is awareness of exceptions to the experience-based rules!

Of course, a number of attempts have been made in research about expertise and about learning and professional development that point to similar ideas as we do in our i-PPP model of professional learning (premise, process, product). For example, Stoeger and Gruber (2014) pled to think about the relationship between an individual who is pursuing expertise in a given domain and all of those assisting individuals and institutions which are making this development possible. Not only is an individual's achievement of expertise in a domain indicative of myriad support efforts, the individual who achieves expertise will usually do so with support of others who have achieved expertise in their respective fields. In other words, once one's eyes are opened to the cooperative nature of excellence attainment, one will also notice a convergence effect. As standards of expertise rise, so do the standards for the resources upon which an individual relies when developing expertise in a given domain. In the case of human resources (e.g. teachers, mentors, coaches), the people assisting an individual in the pursuit of excellence tend to be excellent in their own domain. For instance, an excellent soccer team needs more than just great players. It also needs high-quality coaches, medical staff, etc. The same applies to an excellent scientist. A leading scientist needs a support staff consisting of people who are exceptionally good at the jobs they do in their supporting roles. “Lonely excellence” is a misnomer. Rather, excellence begets excellence.

Similarly, Simons and Ruijters (2004) pled for a thorough analysis of what they called “learning professional”. The definition of a professional relates closely to professions and professional associations. Professions are mostly defined as fields of work that have an explicit body of knowledge described in handbooks and official (scientific) journals and have standards of quality and professional associations. Professional associations bring these people together, define the standards of quality, help

to develop the body of knowledge, and certify education and training that guarantee the quality of the learning outcomes.

Nevertheless, membership in a professional association should not be used as a criterion to define a professional, they argue. Rather a professional should be defined in terms of vision, methodology, and tools and techniques. A professional is a person working in a professional field having an aligned combination of an explicit vision, a unique methodology, and a set of high-quality tools and techniques. In this view, professional learning comprises a dynamic way of relating working and learning, namely, continuously working on vision, methodology, and tools and techniques, and the alignment between these three components by (a) elaborating on her or his work competences, (b) expanding her or his theoretical knowledge and insights, and (c) externalising her or his practical and theoretical insights, which means contributing to the development of the profession and/or to team and organisational learning.

We also argue that confidence, curiosity and pride are emotions bridging these three stages, for example; there is a need for curiosity in order to expand – and expansion leads at a certain point to pride, which stands on the basis of externalising, and so on. (...) Finally we indicated that now a day a model of professional learning cannot be only on individual learning. Collective learning needs to be part of it. We find the three stage model of professional learning equally useful on a collective level, but did not get into this here. (Simons and Ruijters 2004, p. 228)

Finally, Billett et al. (2018) recently pled to merge cognitive accounts with the contributions of the social and cultural environment for a better understanding of the development and maintenance of occupational expertise. They argue that until now, these distinct academic perspectives are more or less isolated from each other. The case of expert performance shows that there is no contradiction between cognitive and sociocultural accounts of expertise, but rather they complement each other, if they are integrated in one model like in the i-PPP model proposed here. A major challenge, however, is how to draw educational or pedagogical conclusion from such an integrated model. The different perspectives may lead to different conclusions about how best to support the development of expertise.

A cognitive perspective may incite to focus on instruction whereas the sociocultural perspective emphasises the importance of social negotiations and practices for development. A view into the past reveals that learning through practice has been the basis through which most of occupational capacities have been developed across human history and, likely, across working lives. Yet, to more effectively secure those capacities and contemporary occupational expertise, the organization of workplace experiences (i.e., practice curriculum) and their augmentation through practice pedagogies are required. (Billett et al. 2018, p. 121)

#### *4 The Finale: Educational Insight – How Best to Prepare Individuals?*

After this extensive elaboration of expertise development, the final paragraph aims at discussing educational conclusions. It is an important educational task to understand expertise development in order to organise training and workplace settings in a way that supports individuals in their expertise development.

Our main idea developed in this book is that an appropriate understanding of expertise – namely, its development as well as its maintenance – is an integrated understanding of the interdependence between individual and social or environmental contributions on the one hand and the premises, processes, and products of learning on the other hand. It is particularly the area of working life that requires such an understanding, because workers and employees – if becoming or being experts – act within the complex setting of the workplace. A product of learning, e.g. the solution of a problem, can simultaneously initiate further learning processes and, thus, become a premise of workplace learning. All this happens within the daily interaction of and between individuals and artefacts at the workplace.

Considering what exactly constitutes expertise and what we put together in this book, the following needs to be understood.

Experts comprise a huge stock of declarative and procedural knowledge. The classical way of acquiring these kinds of knowledge is to attend training lessons, to read textbook or manuals, and to search for information and assistance. This is the well-established area of educational instructions. However, declarative and procedural knowledge usually constitute the entrance to expertise development. The more interesting phase of expertise development comes with the processing of experiences in applying available knowledge to practical problems. That phase already requires a work environment that provides feedback and – if necessary – guidance and mentoring. This phase of development can be described in theoretical frameworks as discussed within this book. It leads in a last phase to the development of routines and rich experience-enhanced patterns of recognition that enables experts to intuitively perform extraordinary well – particularly in novel problem situations. From an educational point of view, this last phase bears challenges, because this last form of knowledge – which is crucial for the constitution of expertise – is idiosyncratic and is, thus, very difficult or impossible to codify and even to verbalise. Hence, the question arises how to mediate such kind of knowledge that is hardly describable. As we worked out, the major input for the acquisition of this kind of knowledge is experiencing practice. Again, this phase of development depends on the social and physical environment at the workplace that provides learning opportunities.

Hence, at all phases of expertise development, appropriate knowledge acquisition results from a merge of individual and social contributions from the workplace. It is important that the quality of feedback, guidance, and support from the workplace meets the requirements of the level of expertise. In the beginning and on the way to expertise development, learners need persons who are superior in their knowledge and skills. These persons may act as that kind of role model that we characterised as person in the shadow. Workplaces and companies as organisations need to be considered as communities and expertise development as gradual growth into a community. Such development occurs through permanent interaction between an individual with the social and physical environment. Having reached expertise, the maintenance of expertise also relies on the integration into a community or network of experts in order to find peers as interaction partners for discussing experiences and ideas. This way, experts are able to refresh and update their knowledge and consolidate novel ideas. Hence, developing and maintaining expertise permanently requires learning through practice experiences at workplaces.

A prominent example for the power of learning through practice by growing into a community of experts through guidance by mentors refers to the chick sexing problems that chicken farms face since they work in competitive market environments. Since male chicken do not lay eggs, they are not productive for a chicken farm. Hence, chicken farms need to separate male and female chicken at the very young age of 2 or 3 days. Even though a lot of knowledge exists about differences between male and female chicken of this age, it is very difficult to factually identify the sex of such a chicken (Gibbs 2016). There is a classical empirical study in which two different ways of training the skill of chick sexing were compared (Schroeder 1933): The first way represents the Western academic way of teaching individuals declarative knowledge and enabling them to test the application of knowledge in order to develop procedural knowledge. The second way represents an alternative that consists of a more holistic approach in which learners become member of a Zen monastery for several months. In that period they receive training in Zen philosophy, they train their body control, e.g. through meditation and physical and mental exercises, and they escort a master who gradually introduces them into chick sexing. The result of this study reveals that chick sexers who took the Zen way perform much better and faster than those who were trained the traditional way. Interestingly, there are

repetition studies which confirm the finding of the classical studies at least twice (Biederman and Shiffrar 1987; Lunn 1948). These studies show that there are manifold contributions to the development of extraordinary performance skills, and some of them may even not directly be related to a topic itself.

In a final paragraph, we suggest some educational conclusions for shaping work-places and companies in a way that they provide an inspiring environment for individuals to develop and maintain expertise. With these suggestions we load workplaces with educational ideas that aim at professional learning through practice which can be called practice pedagogies (Billett et al. 2018).

- *Establishing a learning culture.* All discussions about professional learning and expertise development in this book revealed the importance of work activities that serve learning purposes. Hence, this implies that learning activities need to be acknowledged in a similar way as work activities. Discussing, reflecting, and seeking for assistance may temporarily impede other work activities and, thus, constrain the work output on a short term. The benefit of learning activities may be realised later only. The concept of learning culture describes work practices that commonly shared acknowledge learning during work (Harteis in press; Marsick and Watkins 2003). In accordance with Schein's concept of organisational culture (Schein 1985), the implementation of a learning culture requires the members of an organisation to share values that acknowledge learning activities and to establish corresponding practices.
- *Making knowledge accessible.* Incidents that appear trivial or putatively simple are among the biggest challenges for learning through practice. Those incidents usually are details of a larger sequence of operations that remain unseen, because they are, e.g. part of a script of an activity. In order to facilitate learning through practice in those cases, it is important to make knowledge accessible that is difficult to be accessed because it remains to be unseen. Geriatric care is an area of work where learning through practice has a particular importance because many untrained staff enter workplaces and need to be trained during regular work. An example for an incident that easily remains unseen is the particular challenge of feeding geriatric clients (Goller et al. in press), because experienced nurses as well as the untrained novices assume to know how to feed because all have experience in feeding babies. However, geriatric clients may face particular problems, e.g. during swallowing, that need to be explained to novices. That means, people at workplaces need to be willing and capable to reflect upon own implications and to explain issues to others that reputedly appear self-evident.
- *Feedback and support.* In a more general way, our discussions in this book revealed that feedback giving and providing support are crucial contributions to professional learning and expertise development. This particularly applies for the earlier stages of expertise development, but feedback is still important for the maintenance of expertise. The provision of feedback and support cannot be taken for granted, especially in competitive environments. However, both are inevitable components of a productive learning culture. Research has shown that it requires an appropriate quality of feedback in order to foster learning (Rupprecht et al. 2010; Whitaker and Levy 2012). Hence, members of an organisation perhaps need to be prepared to be willing and capable to provide feedback and support of appropriate quality.
- *Deliberate practice.* We have extensively argued the importance of deliberate practice for professional learning and expertise development. It is a matter of course to consider deliberate practice in our educational conclusions. It is not only the learner's responsibility to engage in practising but also a mentor's task, as the discussion of persons in the shadow revealed. It is particularly challenging to integrate deliberate practice into daily working life which is clocked by working tasks and deadlines that have to be met. However, it is important that



individuals find opportunities or advanced colleagues reveal learners' opportunities to practise the application of freshly acquired knowledge.

- *Promoting recall and knowledge application.* For novices entering a professional domain, it is of particular importance that they receive guidance and scaffolding in order to acquire relevant knowledge. One of the most important tasks of mentors is to guide (novice) learners and to provoke them with challenges and their repetition during daily work. Repeating tasks offers learners the opportunity to consolidate their knowledge, but it is of particular importance that mentors stimulate learners to recall the knowledge they applied. That helps to reflect experiences in knowledge application and supports the compilation of declarative knowledge towards procedural knowledge.

Workplaces that implement these practices are for sure fruitful environments for professional learning and expertise development. Again, these final conclusions reveal that individual and social contributions are intensively interrelated and that a separation within practice settings is simply not possible. Simultaneously, premises, processes, and products of learning are analytical dimensions rather than different slots of learning reality. Processes as well as products can initiate further learning processes and can, thus, serve two of these dimensions at the same time. With our i-PPP model, we hope to overcome the traditional separation of these contributions to professional learning and expertise development. Furthermore, we hope to inspire future research as well as future work practice. We would be glad if colleagues seize our i-PPP model as a suggestion because it is not considered to be terminated but requires further elaboration like the permanent change of sun and moon.

### **1.2.5. Boundary crossing approach (Maarit Virolainen)**

The boundary crossing approach has explored the question of transfer, i.e. what is learnt at school and how it could be transferred to practises outside school. It has investigated and reframed the idea of transfer of knowledge, and what could be or should be counted as transfer. The reframing has been based on the comparison of cultural–historical activity theory with other current approaches to transfer ( Engeström et al. 2003; Konkola et al. 2007). The approach has in particular addressed the debate between cognitive approaches and situated or socio-cultural approaches. According to the situated approach there is a need to acknowledge that knowledge and its utilization are bound to particular situations.

The basic proposition of the boundary crossing approach is that as society is changing constantly, the subjects such as students, teachers or practitioners who are participating in different and various activity systems, have to cross the boundaries of various activity systems. By crossing the boundaries of their own activity they are able to look for and find new information, knowledge and practices from activity systems they were not familiarised with before. This mode of activities, crossing boundaries of activity systems, is called boundary crossing (Engeström et al., 1995), and in its basic model it may include minimally two interacting activity systems.

The interest in boundary crossing approach has increased while the multiprofessional communities of practice have come across problems related to communication. Akkerman and Bakker (2011) have presented an overview of the dialogical mechanisms that are at work in the dialogues where representatives of different activity systems meet. These include: identifying, coordinating, reflecting and transforming the discontinuities of conceptualisations when moving from one community of practice to another. Their overview of dialogical mechanisms was based on a review of studies about boundary crossing. Findings from studies based on the boundary crossing approach have revealed

differences in students' experiences between school and work epistemically (Akkerman & Bakker, 2019).

Examples from empiric studies concerning the 'identification' processes have revealed, for example, how students work to identify their own professional role and tasks in relation to the roles of other professionals (Akkerman & Bakker, 2019). The examples regarding 'coordination' have brought up the coordination work which is demanded and how coordination of the work done by various teams and team members can be planned by utilizing various mediating artefacts across different practices at work (Akkerman & Bakker, 2019).

During internships students had learnt also about reflecting their own work methods, making their own perspective clear and taking the supervisors' position into account for example when utilizing mathematics at work. The examples about 'transformation' have shown both work practices and individuals to transform during internships at work. While the tools and processes for organising specific tasks at work may be transformed, also the individuals' interests and goals in life may change. For example, young students may transform from having a focus in student life toward planning a home for their own family (Akkerman & Bakker, 2019).

Some workplaces have appeared as black boxes in terms of not (enabling) conceptualising the work processes. The empiric study by Bakker and Akkerman (2019) in the context of workbased learning organised in the context of Vocational education and training brought up the need for students to ask critical and reflective questions. Furthermore, it was found important based on intervention regarding combination of school and work perspective in hospital internships, that the boundary crossing was not thought only as the students' task but also teachers and supervisors participated in the problem-solving. Boundary objects, learning tasks such as internship reports helped reflection and making and taking perspectives across the school and work contexts. The internship students' capabilities to become boundary crossers were also promoted with a learning task which demanded them preparing questions for their supervisors and investigated issues that had come up on their own in their laboratories.

### **1.2.6. Chain of recontextualization (Maarit Virolainen)**

By presenting the model of the chain of recontextualization, Evans and Guile address the problem of transfer of knowledge from school context to the context of practice (Evans & Guile, 2012). They claim that the assumptions about "moving from theory into practice" are often too simplistic. For example, it is not only theory which is learnt at school, and the practices where theories or skills are learnt are multifaceted. Their starting point to come to terms with the problem of transfer is to accept that "forms of knowledge are contextual, but not context-bound". In accordance, all forms of knowledge will change when they are transformed from one context to another. As a result, the challenges for pedagogy relate to supporting students to learn to utilise knowledge in different ways in different contexts and for different purposes (Evans & Guile, 2012).

Evans and Guile (2012) highlight the differences between work-based knowledge, practice-based knowledge and discipline-based knowledge and how they follow different knowledge of organisation. While the former give emphasis to the regulatory frameworks set by employment relationship, and practices by professional bodies, the latter gives priority to the disciplinary knowledge-base and its inherent order.

The heuristic model of the chain of recontextualization was developed in the context of studying and analysing study programmes in programs from “banking, aircraft engineering, media practice, financial services, management development (glass industry) and leadership development (civil service)” (Evans & Guile, 2012, 115). The model has appeared as a helpful tool for analysing and thinking about the different modes of knowledge when combining practice-based, work-based and school-based learning.

The theory of recontextualization draws on two conceptual starting points. First, it is based on Bernstein’s ideas about curriculum and how concepts change when they are moved from their disciplinary origins to become part of curriculum taught at school. Second, van Oers has stated that concepts are integral parts of practices, and at the same time, practices vary for different sets of activities at workplaces and fields of production.

The theoretical model of recontextualization characterizes the following four models of recontextualization, which enable the transfer from knowledge from school to practice (Evans, Guile, Harris & Allan, 2010; Evans & Guile, 2012):

i) Content recontextualisation (CR).

In content recontextualization the practitioner puts the knowledge to work in the context of the educational learning programme.

ii) Pedagogic recontextualisation (PR)

The pedagogic recontextualization concerns creating the pedagogic environment where the knowledge is learnt

iii) Workplace recontextualisation (WR)

Workplace recontextualization refers to the work environment as the place where the knowledge is put to work.

iv) Learner recontextualisation (LR)

Eventually, students utilise what they have learnt during the previous steps taken in the chain, and make the use of the knowledge they have learnt (CR).

The findings from the studies which have utilized the model of recontextualisation approach have brought the following aspects from the learning at workplace, for example.

The importance of ‘gradual release’ of learning tasks during work-related learning period and how it enables students to gradually learn sequenced knowledge elements and take responsibility (Evans et al. 2010).

As newly qualified nurses enter work they do a lot of work, i.e. struggle as they are going through the learner recontextualization phase (Allan et al. 2015). In particular, they struggle with time management, delegation and supervision. Finding out about workplace rituals and routines was found important for the newly qualified, as it enabled them to confirm their conduct as nurses in specific workplace practices.

The study conducted by Allan et al. (2016) in the context of nursing education in hospitals highlighted further usually invisible forms of learning like learning through mistakes, learning from difficult experiences, informal learning from colleagues through observations, informal discussion and by



absorbing ways to act in practice from others as well as coming to terms with difficult feelings and uneasiness when supervising students groups, “muddling through”.

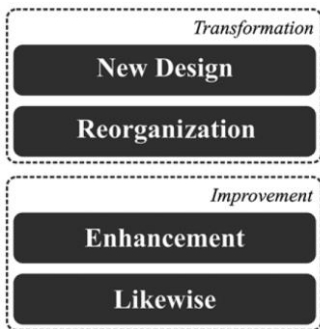
Evans and Guile (2012) have argued as the benefits of their approach (heuristic model of recontextualisation) that it enables making it explicit how knowledge is bound to its context and may be interpreted in different ways in various contexts. Further, the model enables identifying many aspects related to transferring knowledge into practice, such as: actions that are taken to assist people moving knowledge from one context to another, how knowledge changes when it is taken to various social practices and contexts, and how people, practices and contexts transform when adopting new knowledge. In addition, it enables identifying various persons (who) in different roles and positions are supportive for recontextualisation, as well as what kind of tools and methods may be utilised for this purpose in different contexts.

### **1.2.7. Development of individual knowledge and different qualities of workplace learning processes, Christian Harteis**

A particular approach to analyze employees' wpl relates to expertise research which investigates the development of individual knowledge (structures) by the time through experiential learning. Beginners start as novices who simply (try to) follow (textbook) rules or instruction due to a lack of experience. One could follow, e.g., the Dreyfus/Dreyfus model of expertise development that distinguishes five steps of development. With an increase of experience (and deliberate practice), employees develop knowledge structures that allow them to leave strict rules behind and react more flexible to workplace affordances, learn to develop autonomous problem solutions, until they finally reach expert level that allows them to work spontaneously but appropriately - even intuitively (Dreyfus & Dreyfus, 1996; Gruber & Harteis, 2018; Ericsson, 2018; etc pp).

Perhaps also interesting: A model that distinguishes different qualities of workplace learning processes - based on former work from Puentedura (2006), Gerholz and Dorman (2017) developed their LEARN model that comprises following different quality levels driven by technological development:

- Likewise. There are changes in workplace affordances that allow analogue work activities as before but in the new context.
- Enhancement. This level comprises enhanced work practices supported, e.g., through technological development, that allow now more effective/comfortable/flexible work performances but in a new setting.
- Reorganization. Technological development can establish machines that require a reorganization of work practices because they represent work in a new way. Examples here are: Manual tuning versus working with tuning machines, medical diagnostic with x-rays versus MRT.
- New Design. Technological development, however, can also result in the necessity to completely change the arrangement and organization of work, which then requires the emergence of completely novel work practices.



Suggestions for further learning:

Gruber, H. & Harteis, C. (2018). *Individual and social influences on professional learning. Supporting the acquisition and maintenance of expertise*. Cham: Springer.

Harteis, Gijbels & Kyndt (Eds.) (2022). *Research Approaches on Workplace Learning*  
[https://doi.org/10.1007/978-3-030-89582-2\\_20](https://doi.org/10.1007/978-3-030-89582-2_20)

Malloch, Cairns, Evans & O'Connor (Eds.) (2022): *The SAGE Handbook of Learning and Work*

Heisler & Krug (2019) *Second chance learning in germany. A chance for unskilled young workers to obtain a vocational qualification (translation from german)*

Karen Evans, Wing On Lee, Jörg Markowitsch, Miriam Zukas (2021) *Third International Handbook of Lifelong Learning* <https://link.springer.com/referencework/10.1007/978-3-030-67930-9> - several chapters on WBL/WPL contexts

## 2. Social and personal impact of work-related learning

### 2.1. Terminology of work-related learning (Krista Loogma)

There is remarkable conceptual confusion in the field. Some authors distinguish between workplace learning (wpl) and work based learning (wbl) referring to the different epistemological sources (e.g. Hills, et al, 2003). Research of wpl rely often on the human capital theory and use to be applied in organisations in forms of non-formal education (training, still formalised form of learning) related to the strategic needs of an organisation. Wbl however, sprung up from social constructivist approaches to learning and usually refer to individual and/or collective learning at workplace and beyond. (Brandi & Iannone, 2021). The aims of wbl are embedded into the wider context of employment that is much wider than of paid work , (which is addressed by the most of theories). The work context may also include self-employment, contract work, part-time work, unpaid and voluntary work, community work and also new forms of work, such as platform work, crowd work, casual work etc.

The concept “at, for and through work” is expected to be an overwhelming and inclusive concept that includes all aspects of work-related learning (Evans at al, 2011, p 153). As well the term “work learning” was suggested to incorporate a variety of concepts / terms (Allan, 2015).

The transformative changes (technology/digitalisation, distance work, crises) have changed the relations between work and learning in many aspects. First of all, the pressure for mobility of workers at labour markets is growing. The volatility of the labour markets and the growing trend that students work more while studying (at paid and at unpaid work) means that particularly new generations should be/are more mobile in the labour markets moving more between work contexts and settings (Evans, et al, 2011, p. 154).

Because of changes in work contexts, learning generally, particularly informal learning at work, has become a more important aspect of the work and vice versa. In some work contexts the trend “from work-based learning to learning-based work” can be visible (Marsick, Fichter and Watkins, 2022, p. 177-193).

## **2.2. What and how students learn at the workplace (Päivi Tynjälä, Katarzyna Kärkkäinen, Maarit Virolainen and Anne Virtanen)**

So far, research on students’ work-related learning, such as internships, work-based projects and other forms of work experience has mainly focused on vocational education and training (VET) and on higher education (HE), but recently more interest in using workplaces as learning environments has aroused also in basic education. Furthermore, research has widened to examine not only the development of skills and competences, but also pedagogical, social and cultural aspects related to organizing and supporting student learning in partnerships between education and workplaces.

Based on previously developed models and research, various factors have been identified that have a potential to support students’ learning at workplaces including:

- 1) learners’ motivation, previous knowledge and skills, and the workplace itself (presage factors) (Tynjälä, 2013).
- 2) activities and pedagogical practices that lead to acquiring new knowledge such as reflection and collaboration with colleagues (process factors) (Tynjälä, 2013).
- 3) traditional learning (eg. lectures, readings) and tacit knowledge (Anderson, 1983)
- 4) making connections between different types of knowledge through pedagogical solutions involving integration of theoretical knowledge, workplace experiences and self-reflection (Tynjälä et al., 2021).
- 5) reflection on personal practical experiences (Tynjälä et al., 2016; 2021a; Aarto-Pesonen & Tynjälä, 2017).
- 6) adequate guidance (good and enough of it) and constructive feedback (Tynjälä et al., 2016; 2021; Aarto-Pesonen & Tynjälä, 2017; Virtanen & Tynjälä 2008).
- 7) participation (eg., Billett, 2001; Fuller & Unwin, 2004), interaction with more experienced workers (Tynjälä, 2008; Billet 2004).
- 8) emotions and student agency in learning and professional development (Tynjälä et al., 2016; 2021; Aarto-Pesonen & Tynjälä, 2017).

9) creating opportunities to learn to students is as important as students' recognising these affordances and using them for the benefit of their own learning (Billett, 2004).

10) workplace's policy, culture and staff composition which may be then mirrored in opportunities for learning (Kyndt, Dochy & Nijs 2009, Tynjälä 2008).

Some scholars, when analysing students' learning at workplaces, have in particular concentrated on the guidance aspect of it and the role of guidance in learning at workplaces. In relation to it Billett (2004) has distinguished two types of guidance: 1) direct guidance (learning by doing tasks together with more experienced worker/s), and 2) indirect guidance (learning by observing and listening). Filliettaz (2011) next to distributed guidance (guiding a student/trainee in interaction with a number of other colleagues, experts, and trainees and underlining its collaborative character) has distinguished also spontaneous guidance (provided spontaneously by trainers), requested guidance (in the case trainee takes an active role in searching for needed information and support) as well as denied guidance (expressed in the form of trainers' unwillingness to assist a trainee).

As possibility of learning by doing and engagement of all senses, integration of different types of knowledge is recognised as supportive factors of migrant students' learning It has been recognised that in the context of students' learning at workplace it is important to take into account that many activities at work are socially shared and have collaborative character (Tynjälä 2008). This has many implications for organising students' learning and guidance practices at workplaces with putting emphasis on creating possibilities for collaboration and collaborative learning. In the context of vulnerable students' learning at the workplace it has been found out that learning by doing and engagement of all senses, integration of different types of knowledge is of great importance, for example, for migrant students' learning (Kärkkäinen, 2017; Sandwall, 2013). It can be to expected that these aspects are also in play for any student's learning.

The aim of all of these supportive actions is to become confident with performing the tasks, also this more complicated one (Lave and Wenger 1991), and gradually becoming a part of "community of practice" (Wenger 1999).

Internships are a widely realized approach to allow students (at all levels of education) wpl experience. They are particularly designed as learning opportunities but in real life work contexts. Goller et al. (2020) revealed that for internships material and particular social support from colleagues and supervisors are important drivers for students' wpl.

In a Finnish study about university of applied sciences students' internship experiences in the field of business and technology, the findings pointed out the demand for individualised learning assignments, negotiating personal learning goals with the help of teachers' guidance, and support for recognizing challenges for personal professional development, as well as developing assessment methods for learning self-assessment during internships, in order to enhance learning from work experience (Virolainen, 2009).

An Australian study brought up that students' ability to reflect on the workplace learning experiences was crucial for their developing a better understanding about what they had learnt and how they could apply it at work in the future (Cord & Clements, 2010).

The positive influence of work-integrated learning has been seen, for example, in improved academic performance (Brooks & Youngson, 2016) and academic outcomes (Binder et al. 2015); enhanced

employment (Silva et al., 2018); and in better quality and relevance of employment (Jackson & Collings, 2018).

However, also, reasonable amount of workload, adequate supervision as well as students' interpersonal and professional skills have been found meaningful for learning during internships (Naidoo et al. 2017; Ross et al. 2018; Irwin et al. 2019).

Virtanen, Tynjälä and Collin (2009) compared the characteristics of students' and employees' learning at work. More specifically they examined what and how students learn at work in different vocational fields. Their findings showed that features typical of employees' learning can also be found in student learning. In the same way as employees, students' learning was context-boundly (and field-specifically) and experientially (i.e., previous work experience had a learning-promoting effect). In contrast to employees' learning at work, students' work-related learning was more concretely focused on learning different kinds of knowledge and skills, and they also worked more alone than collaboratively. The authors suggest educational practices should utilise more certain features of workplace learning such as shared practices and collaboration, and, conversely, workplace practices could benefit from using some features of educational practices, such as guidance and goal orientation in learning.

In the recent study by Tynjälä and al. (2022) focus was on work-related study modules organised as part of studies in the Universities of Applied Sciences in Finland across various study fields such as health and welfare, engineering, manufacturing and construction, and information and communication technology and multidisciplinary modules. Students' learning during work-related study modules was found to be enhanced by collaborative learning with other students and employees, working on authentic, concrete projects or assignments at the workplace, reflections on experiences and students taking their own responsibility for learning and actions (p.89). The outcomes for students' learning included: generic skills, such as group working, planning, coordination, taking responsibility, increased motivation, learning to know workplace practices of one's study field and having the experience of what it means to act as an expert and network in the professional field (Tynjälä et al. 2022).

### **2.3. Competencies learned at work (Krista Loogma)**

Competences learned at work, particularly generic/general/transformational competences that possibly contribute for development of agentic capabilities of students/workers and thus, helping create basis for students' better coping in both environments - formal/school and work and more broadly - in their (future) career paths. Mulder et al distinguish between competence and competency (pl competencies). Competence is seen as "a series of integrated capabilities, consisting of clusters of knowledge, skills and attitudes necessarily conditional for task performance and problem solving and for being able to function effectively in a certain profession, organisation, job, role and situation" (Mulder, Gulikers, Biemans, & Wesselink, 2009, p. 757). A competency is an element of competence (as a whole) which is embedded in a certain task or situation and can either be behaviour-oriented or task-oriented (which are related to the responsibilities of a certain job holder or professional). Competencies only get meaning in a specific (working) context (ibid).

There is a number of competences and/or competencies people learn in various working contexts. For example Eraut (2004) has described eight clusters of capabilities (knowledge, skills) people learn at work informally in their own specific work context. Namely, task performance, role performance, awareness

and understanding, academic knowledge and skills, personal development, decision making and problem solving, teamwork and judgement. (p.265).

Another important framework of competences necessary for work and at the same time, possibly learned at work refer to the EU key competences framework for lifelong learning (EU key competences for lifelong learning, 2019). The EU key competencies include eight complex set of competences, including communication in the mother tongue and in foreign languages, mathematical competence and basic competences in science and technology; digital competence, learning to learn as the ability to pursue and organise one's own learning; social and civic competences; sense of initiative and entrepreneurship; cultural awareness and expression. However, what competences and how people learn at work depends on learning potential of work (Nikolova, Van Ruysseveldt, De Witte, Syroit, 2013). The study by Erss and Loogma (see also the subchapter in this report) revealed that the work experience of young people who worked next to the studies at general education incorporate the development of the following general skills and competences which overlapped with EU key competences: communication skills, team work, collaboration; self-regulation skills, such as time management, resilience, patience, handling stress, goal orientation, persistence, concentration, metacognition, incl. thinking about own cognition which helps to regulate behaviour; practical skills related to a specific field or subject, incl. sports, financial literacy; generic work skills, incl. discipline, work ethics, incl. following rules/requirements, responsibility and dutifulness; self-awareness and self-confidence (courage, independence).

#### **2.4. Human agency as an aim of education (Maria Erss)**

The demand for human agency, including student agency must be seen within wider social change. As our social reality changes through development of new technologies, the need for new skills and aptitudes on the labour market and the increasing complexities of the social and natural world, the aims of education cannot remain the same reproduction of the society as was the case in more stable periods of development. The emphasis on student agency reflects a shift of social values towards more emancipatory values (Welzel, 2014) and a more learner-centred approach to learning where students are supposed to play an active role in their education (OECD, 2019).

Moreover, this reflects changes in the understanding of childhood and youth. Both Childhood Studies and the New Sociology of Childhood have reconceptualised the view of children as passive and dependent individuals and understand children as active co-constructors of their environment (Honig, 2009) and participants in society, worthy to be studied in their own right, not just as objects of adult teaching (James 2009). This change is associated with the United Nations Convention on the Rights of the Child (1989, article 12) which states that children have a right to participate in all decisions affecting their lives according to their age and maturity level. According to ecological agency theory, agency can be achieved by combining personal efforts with the 'affordances and constraints of the environment' (Priestley, Biesta and Robinson 2015). Making decisions requires conscious weighing of the alternatives while simultaneously considering the past experience, current resources and anticipating the future (Emirbayer and Mische 1998).

The opportunity to make decisions about what and how one learns has twofold benefits: on the one hand it fosters student motivation in learning and facilitates students taking greater responsibility for

their learning through setting goals for themselves and learning how to learn. On the other hand, it can have wide reaching positive consequences for their entire lives. According to the influential vision document “OECD Future of Education and Skills 2030. OECD Learning compass 2030”, student agency is defined as students’ “ability and the will to positively influence their own lives and the world around them” although the concept is understood differently across cultures (OECD, 2019). Quite similarly, Crick et al. define agency as “the will and capacity to act and to influence others or the environment” (Crick et al., 2015). Trede & Flowers (2020) add to the definition of agency the capacity “to overcome helplessness” while referring to Hitlin and Elder (2007). This means finding ways to enact agency even while having to juggle between personal goals, social expectations and various structural constraints.

In Estonian context, the recent education strategy document “Smart and active Estonia 2035” (2019) stipulates as one of the goals of education the growth of welfare of Estonian society and people which is rooted in “the self-realisation of every person – the opportunity to develop and use his or her abilities and to be the master of his or her own life.” Essentially, this goal is connected to the concept of developing the agency of Estonian people which is to be supported by a „seamless education system that supports individual choices.“ The metaphor of the “seamless education system” refers to a greater integration and appreciation of different forms of education such as academic and vocational, formal, non-formal and informal education, which is an attempt to a more holistic approach to understanding learning in different contexts including out of school and work environments. Every person combines learning experiences and educational choices in his/her own unique way which is why the strategy document mentions the need of supporting the development of “individual learning paths” (Smart and Active Estonia 2035, p. 19).

Developing student agency and fostering students’ motivation to learn is dearly needed particularly in the light of recent experiences of distance-learning during the COVID pandemic. The evidence from Estonian distance learning studies by Estonian Education Forum and Tallinn University (Erss et al. 2021; Tammets et al., 2021) clearly points out the success experiences of students with better self-regulatory skills which can be seen as connected to developing agency (Bandura, 1991) and resilience. At the same time, lack of agency, choice and motivation puts children and youth at the risk of developing negative attitudes towards school (Kutsar, Soo & Mandel, 2019) which, combined with low achievement, can even lead to dropping out of school and/or becoming NEET youth (18-24-year old people Not in Employment, Education or Training). According to Estonian Education and Youth Work Program 2021-2024, Estonia still struggles with a too high percentage of NEET youth (around one tenth of the age cohort) whereas the number of school leavers with only 9-grade education is increasing in younger cohorts. The problem of early school leavers is more prevailing among boys (13%) than girls (7%). Moreover, there are more low achieving boys than girls at the end of the compulsory education (9<sup>th</sup> grade) which means that less boys continue their education on upper secondary school level and in higher education. The lower achievement of boys is explained by their negative attitudes towards learning and school (Education and Youth Program 2021-2024) which indicates a systematic failure of schools and teachers to engage certain groups of boys in learning. Since agency can very well be used also to resist or subvert existing structures and practices (Emirbayer & Mische, 1998), for example to oppose school and teachers which some boys believe is an expression of masculinity (Legewie and DiPrete, 2012), it is important to develop an engaging climate of learning for all which fosters positive forms of agency. This may reduce early school leaving and dropping out which is also an important aim on the European Union level. Currently, the goal for 2030 is to bring down the rate of early school leavers to under 9% (Eurostat, 2021).

## **2.5. Agency as a key aspect of professionalism and life-long learning (Maria Erss)**

Agency is also considered to be a core component of developing professionalism in work related learning (Goller & Paloniemi, 2017). Furthermore, agency plays a key role in lifelong learning and coping with changes in work life (Su, 2011); it has relevance for creativity and transformed practices of expert work (Collin et al., 2018; Hökkä, Vähäsantanen, & Mahlakaarto, 2017), developing meaningful careers and personal well-being (Eteläpelto, Vähäsantanen, Hökkä, & Paloniemi, 2013; O'Meara et al., 2011). Jääskelä et al. (2020) recognise that human agency is dynamic and contextually situated and relationally constructed; it depends on subjective standpoints and the interplay between resources and individual capacities of a person.

Within higher education context Jääskelä et al. (2017, 5) have defined student agency as a “student’s experience of having access to or being empowered to act through personal, relational, and participatory resources, which allow him/her to engage in purposeful, intentional, and meaningful action and learning in study contexts.” They developed a scale for measuring student agency in higher education which comprises three dimensions: personal, participatory/contextual and relational resources. Personal resources refer to aspects of self-efficacy as used by Bandura (1989) and competence beliefs (see Schunk & Zimmerman, 2012) which reflect students’ self-confidence and success expectations. Participatory resources involve the set of factors that enable active and engaged participation, such as “the experienced opportunities for participating, influencing and making choices, becoming interested in the course contents, and utilising peer support in the learning context” (e.g., Edwards, 2005; Lipponen & Kumpulainen, 2011 as cited in Jääskelä et al. 2020). According to Jääskelä et al. (2020), relational resources are viewed in the light of power relations in the learning context, particularly through the sense of equality among students and the experiences of trust and support from the teacher in learning situations (e.g., Eteläpelto & Lahti, 2008).

## **3. Context of work-related learning**

### **3.1. Social ecology of work-related learning (Krista Loogma)**

Rapid changes in economy/labour markets and in societies, the concept of LLL, rising global interconnectedness are raising the complexity of problems related to learning, such as inequalities in learning, learning difficulties & lagging behind in early stages of education, problems of youth unemployment, problems etc. The complexity of the problems related to learning can be treated as complex/wicked problems, which usually have many parties (institutions, actors) involved with complex mutual relationships making the problems, such as unequal access to learning complicated.

Social ecology can be treated rather as methodological approach or metaphor (Weaver-Hightower, 2008) to analyse complex phenomena not as the established theory. The two main analytical directions can be distinguished in the applications of social ecological analysis (Loogma et al, 2023). The Bronnferbrenners` ecological system theory<sup>[K1]</sup> (1979) have the individual development and learning as primary unit of analysis with the focus on the development of an individual in the framework of interdependencies/ interrelations in and between various multilevel (both, closer and distant) environments. The another cluster of applications of socio-ecological approach is related rather to the macro-level analysis, analysis of organisations and various social groups (Evans et al, 2011 p 356) and as well, policy analysis (Weaver-Hightower, 2008). Both approaches share the idea of dynamic



and multilevel interdependencies enabling an ecology to work and self-sustain. However, several different conceptual frameworks for application of this interdisciplinary analysis have utilised as the aims and contexts of phenomena studied varies widely. Social ecology approach has been applied for research across the different areas and for different phenomena in many contexts (Jackson and Barnett, 2020), including analysis of organisations and communities/social groups and as well, analysing “learning individual” in the context of the life course, incl work place learning (Evans, Waite, Kersh, 2011).

For example, social ecology approach or metaphor ( Weaver-Hightower, 2008) has been adopted for research of various fields, such as adult and workplace learning (Evans et al, 2011, Evans, 2020), learning organization (Virolainen et al, 2022), agency development and reflection (Raffo et al, 2015), social learning and development of theory of mind (Mizokawa and Komiya, 2014), experiential learning (Harvey et al, 2016), skills formation (Loogma, 2022), learning and practice in higher education (Jackson, 2020), in policy analysis (Weaver-Hightower, 2008, Raffo et al, 2015) and other fields. Social ecology approach has been applied for a number of studies that are conducted specifically to better understand learning, development and practices in various contexts and uncover factors, that impact directly or indirectly the learning and development in certain practices. (e.g Jackson and Barnett, 2020). Social ecology approach in education can be considered as useful as it demands analysis beyond the policy construction and as well, beyond the educators in classrooms. (Weaver-Hightower, 2008). Generally, by a social ecology we understand the social associations that function in the interplay of multilevel social structures, institutions, individual actors, their interrelations, and interactions. Thus, political processes, historical-cultural circumstances, power relations, socio-economic changes, social relationships can form self-regulating and self-sustaining ecologies (Weaver-Hightower, 2008, Evans, Waite, Kersh, 2014). The analysis of any social ecology can include following categories of elements of an ecology: involved actors and their relationships (cooperation, competition, predation, symbiosis), environments, structures /institutions, processes and changes that allow the process and ecology to work (Weaver-Hightower, 2008, p 156).

Because of self-organisational dynamic qualities that functions without the central regulation individuals and groups have possibilities to exercise *agency* and therefore influence the all dynamics of an ecology through the interdependences ( Weaver-Hightower, 2008). The understanding of human development as contextualised by Bronnferbrenners` ecological system theory coincides with the contextualised understanding of agency that makes concept of agency significant for social ecological analysis.

### **3.2. Connectivity between education and work: Findings from recent empirical studies (Päivi Tynjälä, Maarit Virolainen & Anne Virtanen)**

Connectivity is a concept widely used in research on students’ work-integrated learning (Aprea et al., 2020; Griffiths & Guile, 2003; Guile, 2011a,b; Guile & Griffiths, 2001; Kyndt et al., 2022; Tynjälä et al., 2020). The concept highlights the importance of close connections between educational institutions and workplaces in supporting student learning. It also refers to connection making between what is learnt at school and what is learnt at work. In other words, integration of theory and practice is seen as a key aspect in facilitating learning. (This is conceptualised in more detail in the model of Integrative Pedagogy described later in this working paper; see.e.g. Tynjälä et al. 2022a, 2022b, see also Billett

2015). Connectivity between education and work is also seen as an important aspect in preparing students for the future labour markets.

Tynjälä, Virtanen, Virolainen and Heikkinen (2022) examined connectivity between Finnish universities of applied sciences and workplaces in 11 work-related study modules where students carried out commissioned projects from companies or the public sector. The researchers interviewed 88 students, 35 teachers, and 17 workplace partners, and analysed the data using the 3-P Model of Students' Workplace Learning as an analytic framework. The role of previous experience was identified as a key background factor of education–work activities both for students and teachers as well as in workplace partners. Regarding learning processes, working with authentic tasks, collaborative learning, and responsibility were emphasised. Some challenges were also raised. All parties produced rich descriptions of learning outcomes. Students experienced that they had learnt various generic skills, responsibility, workplace practices, networking, and acting as an expert. In addition, they felt that their motivation had increased. The teachers reported about professional development as a teacher and decreased drop-out rates of students, while the workplace partners paid attention to benefits such as development of new products or services, and help in recruitment of new employees.

A study by Virtanen, Tynjälä and Eteläpelto (2014) examined which factors explained students' perceived learning outcomes during their work experience in the context of the Finnish VET system. The study addressed student-related individual factors, social and structural features of workplace, and educational practices related to the organising of students' workplace learning; in other words, matters related to connectivity and integration of school learning and workplace learning. Altogether 1603 final-year vocational students answered the questionnaire. The findings showed that students' learning outcomes could not be explained merely by student-related individual factors such as motivation, as has often been thought. Social features of the workplace and pedagogical arrangements were more important factors explaining successful learning. How workplaces make active participation possible and how school learning and workplace learning are integrated proved to be more important. In addition, the study showed that there are differences between different vocational fields in how students perceived their learning environments at the interface of school and work.

### **3.3. Worklife and digitalisation (Hanna Nygren)**

The Fourth Industrial Revolution sets challenges especially for adult learners. The concern in society has been if technology replaces our work, but it seems anyhow that it is exaggerated: “While the concern over technological unemployment has so far proven to be exaggerated, the reason why human labour has prevailed relates to its ability to acquire new skills. Yet this will become increasingly challenging as new work requires a higher degree of cognitive abilities. At a time when technological change is happening even faster, a main hurdle for workers to adapt is thus the surging costs of education” (Frey & Osborne, 2015).

The OECD's Programme for the International Assessment of Adult Competencies (PIAAC) defines problem-solving skills in technology-rich environments (P-S in TRE) in the following way: “Problem-solving in technology-rich environments involves using digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks” (OECD, 2016). The first PIAAC problem-solving survey focused on “the abilities to solve problems

for personal, work and civic purposes by setting up appropriate goals and plans, accessing and making use of information through computers and computer networks” (OECD, 2016).

According to OECD’s PIAAC report there are skill differences between the educational backgrounds and age-groups. Over half of 16-64 year-old European adults have insufficient skills to use technologies. The younger age groups seemed to do better, but still, only 54% had sufficient skills with technology (Nygren et al. 2019). Previous findings indicate, that the skills are related to adults’ socio-demographic background factors, namely, age, educational background, and occupation (Hämäläinen et al., 2015).

It seems that informal learning activities have strong association with sufficient problem-solving skills in TRE 60%. of the adults who reached the sufficient skills level in P-S in TRE were also those who were active with the informal activities (reading, writing, numeracy, ICT skills). What comes to P-S skills in TRE, formal learning had just weak association with it (Nygren et al. 2019).

To meet the demands of future work-life adults need sufficient opportunities to engage in problem-solving in TRE for example offering them design-based learning activities (Chen & Chiu, 2016; Nygren et al. 2019). According to previous studies, three factors are crucial supporting the adults to adapt to technologies: (1) the usability of the technology; (2) the economic and/ or personal advantage the technology poses to an individual; and (3) the social factors that support adaptation to the technology (Coovert & Thompson 2014; Gillan & Bias, 2014; Hancock, 2014).

### **3.4. Business and digital ecosystems and the changing ecologies of learning through and for work (Maarit Virolainen)**

The discussion about ecosystems of learning is one line of research related to the social ecology of WBL presented above. Its upcoming is due to the substantial changes in the organizational setting for learning at work in the 21st century. New ‘ecosystem’ concepts have emerged to try and capture the change, which digitalization and shift toward the era of Manufacturing 4.0 have resulted in the contexts of adult learning and work in organizational settings. These concepts include: ‘digital learning ecosystem’, ‘learning ecosystem’ and ‘ecosystem of learning’, ‘business ecosystem’ and ‘innovation ecosystem’ (see Virolainen et al. 2022). From the learner perspective, and especially concerning adult learners, this shift suggests availability of a multiplicity of learning opportunities (and learning demands) available online and offline parallel to ongoing activities at work.

There has been an overall consensus among researchers that digital learning ecosystems involve characters such as: (a) they enable combining several technological devices with computers and utilization of internet; (b) they benefit from alternating of distant learning and utilizing various written and video contents via internet as well as designing learning tasks both on- and offline; (c) both individual and a changing variety of learner groups may be involved (Kumar & Pande, 2017; Petrushyna & Klamma, 2008).

In contrast, the concept of business ecosystem has its origins already in the 1990s. It refers to companies’ forming coalitions across several industries rather than focusing only on one industry and one field of production to enhance their development, production and marketing of new products and services (Moore, 1993). With respect to the business ecosystem, the ‘innovation ecosystem’, is a more advanced, next generation mode of cooperation among business ecosystems, where the emphasis is on

creating new forms of activities, value creation opportunities and new products (de Vasconcelos Gomes et al., 2018).

The digital ecosystems and digital learning ecosystems may themselves be embedded into business and innovation ecosystems, which connect various types of organisations, experts and activities into networks which are not bound by any geographical locality.

The ubiquitous availability of learning opportunities created by digital ecosystems has been described by researchers with terms such as 'liquid learner' and 'rhizoactivity' (Barnett, 2012; Kang, 2007, p. 207). For learners the new ecosystemic learning opportunities have meant, for example, going through materials delivered in a video course about artificial intelligence or participating in the course itself online via mobile phone while being on train on their way to work (Virolainen & Ihanola, 2022).

The increased pace of change in society due to technological development and trends shared globally (OECD 2019), has invited educational institutions and higher education institutions to vision learning possibilities from a new perspective for their learners. Researchers have visioned learning ecologies embedded in global ecosystems which combine work related curriculum, academic curriculum, extra-curricular activities and learning organised outside formal curricula. Such an approach demands guiding students toward picturing and designing of a lifewide curriculum (see Barnett & Jackson, 2020).

## **4. Approaches of integrating work-related learning into classrooms**

### **4.1 Real-life work experiences in classroom teaching and learning (Kaidi Nurmik & Inge Timoštšuk)**

Nurmik, K., & Timoštšuk, I. (2023). SUPPORTING PRIMARY STUDENTS' AGENCY AT SCHOOL THROUGH LIFE-WORLD EXPERIENCES. In *INTED2023 Proceedings* (pp. 7259-7266). IATED. *Abstract:*

Student agency is a capacity to act in ways that reveal their own choices in their learning and enrich the whole learning process - students influence their own lives and the world around them. Moreover, students manage better their life if they are able to practice agency at school, however, teachers are lacking pedagogical practices through which to support student agency (Charteris & Smardon, 2018; Vaughn et al., 2020). In other words, involving students' life worlds in the learning process could support the development of agency. The concept of life-world is part of an ecological theory of knowing that prioritizes engaged participation in real-life and rich contexts (Barab & Roth, 2006). Life-world describes students' material world and social surroundings in which they find themselves (Barab & Roth, 2006). In our research, the focus was on students' personal interests, hobbies, after-school activities and parents' professional life and interests. Our aim was to understand how primary teachers have involved students' life worlds in the learning process and what impact they have noticed on the students' learning. We conducted semi-structured interviews with 11 primary school teachers to collect rich and thorough data. The preliminary results of the study indicated that teachers have involved students' life-world experiences for the purpose of enriching school life with examples of new and exciting activities. Also supporting relations with a broader social context is evident. Nevertheless, the possibility to enrich the learning content is not the focus. Still, it could be concluded that by implementing life-world activities, the teachers have recognised the possibility to support the students' agency.

## **4.2 Supporting middle school students agency at school (Anne-Mai Näkk & Inge Timoštšuk)**

(overview of manuscript in process)

In the framework of learning ecosystems, students' learning paths are diverse and include aspects of their personal lives. Learning is meaningful when one is able to connect the subject content to their everyday life and understand the context. Teachers face a challenge to create well-balanced learning situations that integrate students' lives outside the classroom and the curriculum. Moreover, Estonian middle school students have posited that learning is rather subject-centred, and they perceive little personal meaning of the learning content. In Estonia, last year primary school students are being taught by primary teachers and subject teachers, making it an important transitional period for students. During this period, teacher support is crucially important for experiences of meaningful learning, therefore our aim was to examine last year primary school students' ( $N = 966$ ) perceptions of integration of everyday life aspects in classroom learning (such as practical usefulness, importance, value). Data were collected via an online questionnaire. Using hierarchical and then K-Means cluster analysis, four profiles were found including *Integrators* (20.6%), *Explainers* (29.2%), *Subject-oriented* (17.6%), and *Inconsistent* (32.6%) profile. Further results revealed that perceptions of students belonging to the groups of *Integrators*' and *Explainers*' teaching practices were statistically different regarding all everyday life aspects, whereas some aspects were not perceived significantly differently for *Subject-oriented* and *Inconsistent* profiles. The results contribute to the understanding of establishing a rich learning context from the perspective of students. Furthermore, the results highlight a need to emphasise the value of carefully balancing personal contexts and curriculum in classroom teaching practices to support students' meaningful learning.

## **4.3. Out-of school work experience of secondary school students predicts student agency in school (Maria Erss)**

In a recent (2022) quantitative study on student agency in Estonia (Erss and Heidmets, manuscript in process; Erss, Loogma, & Jõgi, under review) a new measurement instrument was developed and piloted which defined agency by the constructs of agentic engagement (Reeve and Shin, 2020), resistance to perceived injustice (Mameli, Grazia and Molinari 2021), perceived agency support by teachers (Reeve and Shin, 2020) and persistence in pursuits/perseverance (Vaughn 2021; Dweck 2006). In the study which involved 9207 students from grades 6-12, including 8510 students from schools with Estonian as an instructional language and 697 from Russian language schools, the factors that predicted student agency in school were identified. According to a SEM analysis, the factors that were significant predictors of student agency were school's instructional language, gender, school stage, perceived agency support by teachers, persistence in pursuits, socio-economic background (as measured in number of books at home), and work experience.

According to the study of Erss, Loogma & Jõgi (under review), higher agency scores were reported by students who attended schools with Estonian instructional language, boys, students in higher school stages and students who had as proxy of their socio-economic background at least 200 books or more at home. Also students who perceived higher support to their agency by teachers and who reported strong persistence in their pursuits had higher agency scores. And finally, certain types of work experience predicted agency: occasional work on school holidays, other paid work (i.e. in own

business), participation in student work camps and voluntary work were strongly correlated with student agency. Surprisingly, current or past steady employment was not positively correlated with agency. Perhaps this type of work negatively affects school attendance or academic achievement. Another possible reason is that students who work more intensely alongside school are likely less academically motivated (Mortimer 2010).

The study (Erss, Loogma, & Jõgi, under review) also showed differences in the work experience of Estonian and Russian speaking students. Estonian speaking students were more than twice as likely to have accumulated work experience than Russian speaking students, particularly working in holidays, student camps and doing voluntary work whereas Russians were slightly likelier to have a current paid job.

Students were asked to reflect on what they thought they had learned through work experience. From their open responses it could be gathered that they have learned at work mostly social and field- or subject-specific/academic skills and competences but also self-regulatory competences, self-confidence and self-awareness which makes achieving one's goals easier. However, to what extent students perceived working as being useful also for other purposes besides earning money, depended on the nature of their work. Most students had work experience in the service sector: working in restaurants as cleaners and waitresses, in advertising, photo services and bookkeeping, which is why it is not surprising that most students mentioned social skills as an important skill they learned at work (Erss, Loogma, & Jõgi, under review).

In conclusion, students do develop agency related competences through work although these competences are not always transferred to school context (Erss, Loogma, & Jõgi, under review). This can be explained by the concept of ecological agency that presumes that agency can manifest itself differently in various (learning) environments due to different affordances and constraints (Priestley, Biesta and Robinson, 2015).

## **Suggestions for further reading:**

### ***Methodology***

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### ***Learning engagement***

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### ***Student agency in different cultural contexts***

Erss, M. (2023): Comparing student agency in an ethnically and culturally segregated society: How Estonian and Russian speaking adolescents achieve agency in school, *Pedagogy, Culture & Society*, DOI: 10.1080/14681366.2023.2225529

## **Summary**

Our working paper (D6.1) explores the theoretical foundations and methodology of integrating work and learning, focusing on significant aspects of school learning. We organised the text as a collection of subchapters. The text includes some short overviews of recently published relevant research papers of FEWL project members and reading suggestions.

In the first chapter, the authors explore different research lines relevant to employee and student workplace learning. In addition, we presented the selection of relevant concepts and theoretical models. Stemming from the theoretical perspective, the social and personal impact of work-related learning is explained in chapter two. Similarly, as the effects of the work experiences are significant, work-related learning experiences are context-bound, and this relationship is described in more detail in chapter three. We also provide the most recent information about empirical data about approaches to integrating work-related learning into classrooms on different levels of school education (see mainly in chapter four).

At this point, we can conclude that the problem of integration of learning at school and learning at work should be approached as a multilevel phenomenon – e.g. personal, institutional, and pedagogical, depending on the goals and extent of learning (cf., e.g. Billett, 2015, 167 ).

We will use the text (D 6.1) to discuss the next steps of the research-related activities within the FEWL project. Furthermore, based on the project aims, we will continue developing our understanding of personal and institutional factors and mechanisms influencing school and work-related learning integration for agency development (as planned for the following working paper D 6.2).



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