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**Title:** Factors promoting vocational students' learning at work: study on student experiences

**Year:** 2014

**Version:**

*Factors promoting vocational students' learning at work: Study on student experiences*

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## INTRODUCTION

Continuous changes in working life have meant that educational institutions have had to develop new ways to ensure their students' competence. In recent educational discussion it has been argued that the traditional forms of formal learning in schools are not adequate to cope with contemporary learning challenges (Hakkarainen et. al. 2004; Lehtinen 2008; Tynjälä & Gijbels, 2012). Because of this, less formal elements such as project and portfolio work have increasingly been introduced into formal education (e.g. Heikkinen, Jokinen, and Tynjälä 2012). In addition, the expansion of practical training periods has been seen as desirable, on the grounds that these will lead more relevant, efficient, and transferable learning, and will offer students a more holistic experience (e.g. Harris et al. 2003). In Finland, a determined step towards the inclusion of informal learning environments in education was taken by the vocational education and training (VET) system at the beginning of the millennium. According to the reformed degree requirements, vocational students must acquire at least one-sixth of their vocational qualification outside the vocational schools, within authentic workplaces. However, students are not simply sent to the workplace to practise what they have learned in the school; the system is organized in such a way that students are set learning goals for every workplace learning period, and their learning at work is guided and assessed. This system is called *workplace learning*, and it is intended to ensure the topicality of students' adopted skills and knowledge – and further, to facilitate the recruitment of students after they finish their school studies, and to promote the interplay between vocational institutions and the world of work (e.g. Vocational education and training in Finland 2011).

We believe that students' learning will be increasingly shifted to the workplace (see also Streumer and Kho 2006). In order to promote effective pedagogical practices for students' work-based learning, we need to understand better how students' learning at work can be supported. However, the starting points for employees' and students' learning at work are different, and research on employees' workplace learning cannot be directly applied to students' workplace learning. For employees, learning at work may be a by-product that accompanies normal work; for students on the other hand, learning at work is the main purpose of their workplace learning periods. The purpose of this study was to examine in more detail how students' learning at work can be supported.

In this study, students' learning at work will be examined in relation to students' self-assessed learning outcomes. However, the learning outcomes are understood more widely than in the definitions of the European Qualifications Framework (EQF) (see e.g. Explaining the European… 2008.) Students' learning outcomes at work will be considered here not merely as skills learning, but also as involving students' vocational identity development. Particularly outside Europe, vocational education is often viewed not purely as a system for the inculcation of skills and knowledge, but equally as an endeavour aiming at students' wider vocational development (e.g. Chappell 2003). With this in mind, the present study seeks to describe students' professional growth somewhat more comprehensively than would be the case if the students' learning at work were understood purely as skills learning (e.g. Nyström 2009).

In the following section, we shall introduce the theoretical background of this study, as applied to the factors that may explain students' learning at work.

# STUDENTS' LEARNING IN THE WORKPLACE

## Individual and social features of workplaces

Students' workplace learning is a challenging research topic, since it can be examined from the viewpoint of both formal learning and workplace learning. The perspective makes a difference: research has shown that formal learning and workplace learning tend to have different characteristics. Formal learning is often characterized as theoretical, planned, largely explicit, and focused on individual activities with predictable outcomes, whereas learning in the workplace is described as unplanned and implicit, often collaborative, highly contextualized, and leading to unpredictable learning outcomes (e.g. Billett, Harteis, and Eteläpelto 2008; Eraut 2004; Fuller and Unwin 1998; Hager 1998; Resnick 1987; Tynjälä 2008).

The features of students' workplace learning have been less intensively studied; however, it appears that students' workplace learning may be more individual in nature than employees' workplace learning (Virtanen, Tynjälä, and Collin 2009). It further appears that some features of formal learning may transfer to students' learning at work. The same phenomenon has been perceived in studies on expertise (e.g. Eteläpelto 1998). In both cases, it has been observed that in the novice phase, individuals are not able to work with others, due to the fact that their concentration is directed at the completion of their own tasks.

Interestingly, the constraints on the two main forms of learning mentioned above (formal vs. workplace) seem to have different sources. The constraints on formal learning have mostly been associated with the individual, and include aspects such as a lack of individual motivation (e.g. Mulder et al. 2006), or a failure to obtain and store the knowledge that was supposed to be learned (e.g. Smeby and Vågan 2008). By contrast, the constraints on workplace learning often relate to the structures and the social environment of the workplace (e.g. Billett 2002; Sharrock and Button 1997). Among students, the social environment of the workplace does not seem to restrict their learning at work – but nor does it always seem to promote such learning (Collin et al. 2008). Surprisingly, in some studies the social support of the work community has actually been observed to have a negative effect on students' work-related learning (Gijbels, Raemdonck, and Vervecken 2010). The evidence so far seems to suggest that the limitations on students' learning lie within the students themselves; in particular, a lack of motivation has been seen as a major constraint on vocational students' learning in many countries (Mulder et al. 2006).

From the above, we note (i) that different elements may function as restrictions on formal and informal learning, and (ii) that features of both formal and informal learning have been perceived in students' learning at work. Hence, in examining the factors related to students' learning at work, it seems appropriate to study both student-related individual factors, such as factors related to motivation, and also elements related to the social and structural features of the workplace. Indeed, recent studies have supported the notion that both aspects – individual (and subjective) experiences, and social and institutional contexts – are important for learning and professional development at work (e.g. Billett 2006; Eteläpelto and Collin 2004; Eteläpelto and Saarinen 2006; Harteis and Billett 2008; Hodkinson, Biesta, and James 2008; Lehtinen 2008; Tynjälä 2008).

**Towards connective and integrative learning environments**

A vocational student generally has two learning environments: a school, which is considered to be a place for learning more theoretical knowledge, and a workplace, which is considered to be a place for learning more practical knowledge. However, recent studies on the development of vocational and professional competence have questioned this dualism between theoretical school learning and practical workplace learning, emphasizing rather the unity and integration of different forms of knowledge (Bereiter 2002; Collin and Tynjälä 2003; Eraut 2004; Leinhardt et al. 1995; Le Maistre and Paré 2006; Tynjälä 2008, 2009). In other words, recent pedagogical thinking suggests that the forms of learning in question – formal school learning and less formal workplace learning – should be integrated with each other. Some researchers have suggested that the connection between theory and practice should be written into curricula (Guile and Griffiths 2001; see also Boud 2001; Fuller and Unwin 1998; Young 1998). In particular, the *connective model* of work experience by Guile and Griffiths (2001) and the *integrative pedagogy* proposed by Tynjälä (Tynjälä et al. 2006; Tynjälä 2008, 2009) call for pedagogical practices that "force" students to conceptualize practical experiences in a reflective way, and to particularize theoretical models and frameworks in workplace practices. The main difference between the two models is that the connective model focuses on the general level of collaboration between school and work, whereas the integrative pedagogy model operates at a more concrete pedagogical level.

In the workplace learning component of the reformed Finnish vocational education and training system, one can see some of the features that are emphasized in the models mentioned above. For example, Finnish vocational students are not simply sent to the workplace so that they can practise what they have learned at school; the underlying notion is that the goals for every workplace learning period should be derived from the curriculum. This means that they are stated in writing, and that all the parties involved in workplace learning (i.e. the student, teacher, and workplace trainer) are expected to be aware of them. In addition, students' learning at work is guided by a workplace trainer, who, in addition to her/his own work duties, tries to ensure that the student's goals will be attained during the workplace learning period. A further element is that workplace learning is followed by an assessment discussion in which the student, teacher, and workplace trainers take part; this discussion involves further evaluation of how far the student has attained the goals that were set before the workplace learning period. Thus, Finnish vocational students' learning at work can be described as goal-oriented, guided, and assessed learning in the workplace. In this sense it differs significantly from employees' workplace learning which is often incidental and which takes place in addition to or in parallel with the work (e.g. Collin 2005; Marsick and Watkins 1990; Virtanen, Tynjälä, and Collin 2009).

All this means that among the conditions applying to workplace learning periods, we can find elements that are emphasized in recent studies on learning at the interface between school and working life, and on the integration of theory and practice. Indeed, this holds true whether the system is looked at from the broader perspective of education-work connections (Guile and Griffiths 2001) or that of more micro-level pedagogical practices (Tynjälä 2008).

In line with current pedagogical ways of thinking, we shall here seek explanations for students' learning at work, going beyond a narrow concentration on individual or social-structural features, and focusing also on the interface between school learning and workplace learning. This should allow us to better take into consideration the actual community of practice of vocational students (Wenger 1998; see also Reid et al. 2008), and further, to understood better the settings of students' learning environments in which they learn their own vocation.

## RESEARCH STRATEGY

The purpose of the study is to identify factors that promote student' learning at work and, consequently, to suggest how students' workplace learning can be supported. Students' learning at work will be examined in terms of the acquisition of skills and knowledge at work (i.e. students' skill-related learning outcomes at work), and in terms of students' vocational identity development at work. More specifically, we shall address the following research questions:
(1) What factors explain students' workplace learning outcomes (i.e. their skill-related learning outcomes and vocational identity development at work)?
(2) Are there differences with regard to these factors between different fields of VET?

To find answers to the research questions we collected data using Internet questionnaires. The subjects of the study were all final year students of two large VET providers (N = 3106). They belonged to six fields within Finnish VET: (1) technology and transport, (2) social services and health care, (3) commerce and administration, (4) tourism, catering, and domestic services, (5) natural resources, and 6) culture. In total, 1603 students (52 %) answered the questionnaires. The students' average age was 21.35. We examined in more detail two vocational fields, namely (i) social services and health care, and (ii) technology and transport. The reason for this choice relates to earlier findings from these fields – including, for example, the finding that students in social services and health care give higher self-assessments than those in technology and transport concerning the skills what they have acquired during their workplace learning periods (Virtanen, Tynjälä, and Collin 2009). It has also been observed that the findings related to vocational identity development were stronger among students in social services and health care than among students in technology and transport (Virtanen, Tynjälä, and Stenström 2008). Thus, students in the social services and health care fields seem to have more supportive and expansive learning environments than students of technology and transport. This finding has led us to a closer examination of these two fields, as reported in this study.

A confirmatory regression analysis (stepwise model) was used in analysing the supportive factors relating to students' learning and vocational development at work. This is a method that makes it possible to assess the emphasis and range of different aspects of the learning environments in question.

## BUILDING THE REGRESSION MODEL

### Dependent variable

Initially we used two separate dependent variables: (1) students' skill-related learning outcomes at work, with students' learning at work measured as the acquisition of different kinds of skills and knowledge; (2) students' vocational identity development at work, measured as students' vocational growth during their workplace learning periods.

*Students' skill-related learning outcomes at work*: The students were asked to assess their learning outcomes on 29 different generic skills, using a five-point scale (1=nothing, 2=some, 3= a fair amount, 4=a good deal, 5=a great deal). These skills were drawn from (i) recent studies on the development of vocational competence, (ii) accounts of the skills requirements of working life, and (iii) skill descriptions within the National Core Curricula for VET (e.g. Ammatillisen

peruskoulutuksen opetussuunnitelman… 2001; Commission of the European Communities 2005; Rychen and Salganik 2003; Tynjälä et al. 2006). Because students from the different vocational fields had to be able to answer the same questions, there were no questions on field-specific knowledge and skills.

*Students' vocational identity development at work*: The students were asked to assess their vocational identity development, expressing their agreement/disagreement regarding 13 different statements on a four-point scale (1=strongly disagree, 2=disagree, 3=agree, and 4=strongly agree). The statements reflected students' identification with their own field, their assessments of their own vocational strengths and weaknesses, and their perceived needs for development in the future. Thus, the statements sought to capture a view of recent studies on vocational or professional identity, with the emphasis on its dynamisms. From this perspective, identity is not restricted to the present moment ('who I am at this moment'), but is seen as developing through life; hence previous experiences and also expectations of the future can be regarded as part of one's vocational identity (e.g. Beijaard, Meijer, and Verloop 2004; Eteläpelto 2007; Vähäsantanen and Eteläpelto 2009).

In fact, when we analysed our results, we found that almost the same factors explained *both* dependent variables (i.e. students' skills-related learning at work and their vocational identity development at work). The correlation (Pearson's correlation coefficients) between these dependent variables was reasonably high; .647 (**). This implies that either we did not succeed in the creating an instrument which would measure separately the phenomena of learning at work and vocational identity development, or else, that these phenomena are so closely connected to each other that they can be considered as part of the same phenomenon. As regards the latter option, the high correlation suggests that at the initial phase of professional growth skill development and vocational identity development "go hand in hand". Thus, students showing better skills also identify themselves as competent workers in their field, and vice versa, low-skilled students express lower level of identification into their vocation. From these considerations, we were led to create just *one* dependent variable (*students' workplace learning outcomes*) which could be expected to measure both students' skill-related learning outcomes at work and their vocational identity development at work. However, because the scales used for measuring students' skills-related learning and vocational identity development at work were different, the variables had to be standardized in order to create a combined aggregate scale.

On this basis, an aggregate scale of *students' learning outcomes at work* was formed from the variables related to both students' skill-related learning outcomes and their vocational identity development at work (Table 1). Table 1 shows the final list of 35 items out of the initial 42 items. Seven items were removed for theoretical and empirical reasons, since it was found that they did not load the scale meaningfully. (These items were as follows: *trade union activities, bad practices, shirking duties, the disadvantages of my field*, *"The workplace learning periods have made me wonder whether I am in the right field after all*," *"During the workplace learning period I had to change my preconceptions about what I had learned at the school,"* and *"I think that it is possible to work for the pay only."*) Cronbach's alpha for this aggregate scale was .95, and the correlations of items with the aggregate scale were at least .33.

INSERT TABLE 1 ABOUT HERE


**Independent variables**

As indicated in the section on the theoretical background, the study sought explanations for students' learning at work and their vocational identity development at work through three kinds of explanatory factors: (1) *student-related individual factors*, (2) *the social and structural features of the workplaces*, and (3) *educational practices*. The elements within these three groups of factors are set out in more detail in Table 2; these groups, considered as single entities, also formed the independent variables in our regression analyses. Unless otherwise indicated, all the measures were assessed using a 4-point Likert-type scale (1=strongly disagree, 2=disagree, 3=agree, and 4=strongly agree). Exploratory factor analyses (PCA) were used to build the aggregate scales. The content of these aggregate scales is described in Table 6 (Appendix).

INSERT TABLE 2 ABOUT HERE

The *student-related individual factors* consist of students' motivational orientations, and their prior work experiences (Table 2). It is important to include motivational orientations in the study since previous studies show that they play an essential role in student learning and study success (e.g. Pintrich 2004; Tynjälä et al. 2005; see also Mulder et al. 2006). Students' motivational orientations were measured by nine statements which were based on previous studies on students' task-oriented motivation (Dweck 1989; Elliot 1999; Niemivirta 1998; Pintrich 2003; Salonen, Lehtinen, and Olkinuora 1998; Vauras et al. 2001). On the basis of the factor analysis, two aggregate scales were formed: *achievement orientation* (ά = .66) consists of three items, and *avoidance orientation* (ά = .56) consists of three items (see Appendix, Table 6). In addition, three single variables were used: *learning orientation*, *invention orientation*, and *initiative orientation*. Since it is widely agreed that experience is essential for learning (e.g. Boud and Miller 1996), and also for learning at work among workers (e.g. Collin 2004; Collin and Paloniemi 2008) and among students (e.g. Virtanen, Tynjälä, and Collin 2009), we asked the students to assess the amount of their prior work experience via an open question. For the purpose of the analyses, work experience was categorized into six categories: 1=no work experience, 2=1–6 months, 3=7–12 months, 4=1–2 years, 5=2–5 years, and 6=over 5 years.

*The social and structural features of students' workplaces* are made up of students' experiences of workplace communities, their discussions with workplace trainers or other employees, the content of these guidance discussions, and the size of the workplace (Table 2). The students' experiences of work communities during their workplace learning periods were examined by a battery of questions including 12 statements. These statements were based on socio-cultural theories and empirical studies on learning at the workplace (e.g. Billett 2004; Eraut 2004; Wenger 1998). On the basis of the factor analysis we formed three aggregate scales: social and interactive support (ά=.80, four items), availability of individual guidance (ά=.79, four items), and active membership (ά=.79, three items) (see Appendix, Table 6).

We were also interested in the forms and contents of guidance, at the workplace and between the school and the workplace. First of all, the students were asked to assess six different forms of guidance, on a three-point scale (1=none, 2=some, and 3=a great deal). The six forms were *discussion with workplace trainer, discussion with employees, learning journals, discussion with the teacher, discussion together with the teacher and workplace trainer*, and *assignments from the school*. As can be seen in Table 2, some of the guidance activities (such as discussion with a workplace trainer and discussion with other employees) are classified within social features of the workplace, whereas the remaining forms of guidance (i.e. *discussion with the teacher, discussion together with the teacher and workplace trainer, assignments from the school*, and *learning journals*) are forms of guidance which happen at school or between the school and the workplace.

Because of this we classified them as features of educational practices. Secondly, the students were asked to assess, on a four-point scale (1=I did not need this, 2=not enough, 3=some, and 4=enough) the content of the guidance. On the basis of the factor analysis, we formed two aggregate scales describing the content of the guidance at work (Appendix 1, Table 6); these were (1) guidance concerning work and work environment (ά=.83; five items), and (2) guidance concerning the student's own development and assessment (ά=.74, three items).

In previous studies one structural feature, namely *the size of the workplace* has proved to be a significant factor constraining or promoting the learning that occurs in the workplace (e.g. Smith 2002; Chiaburu and Marinova 2005). Because of this, students were asked about the size of their workplace on a four-point scale (1=1–9 employees, 2=10–49 employees, 3=50–249 employees and 4= more than 250 employees).

The *educational practices* included five sets of variables. The variables related to integration of school learning and workplace learning are based on   the view of recent learning theories, in which school learning and workplace learning should be integrated and connected to each other from the early stages of education (e.g. Griffiths and Guile 2003; Guile and Griffiths 2001; Tynjälä 2008, 2009)The variables related to different forms of guidance, length of completed workplace learning periods, setting goals for workplace learning, and self-assessment derive from the adopted practices of workplace learning in Finland.).

The integration between school learning and workplace learning was examined by a battery of questions including 13 statements. These statements were based on features of the connective model (Griffiths and Guile 2003; Guile and Griffiths 2001) and features of integrative pedagogy (e.g. Heikkinen, Tynjälä & Kiviniemi, 2011; Tynjälä et al. 2006; Tynjälä 2008, 2009; Tynjälä, Sarja, and Välimaa 2003). On the basis of the factor analysis two aggregate scales were formed: (1) the integration between school learning and workplace learning, and (2) the connection between school and work (Appendix, Table 6).The first aggregate scale, the integration between school learning and workplace learning, describes at a very concrete level the integration of learning between school and working life (based on statements such as, *"Classroom instruction covered topics that were very useful during workplace learning periods," "During workplace learning periods I was required to apply the theoretical knowledge learned at school.")*. The scale is made up of five items (ά=.69). The second aggregate scale, the connection between school and work, describes at a more general level (at the level of the educational system) the connection between school and work (for example, *"Workplace learning and school-based learning are very well integrated with each other"; "It seemed to me that the educational establishment and the workplace cooperated well."*). It is made up of four items (ά=.66).

Within the category covering the practices and demands which had been set for students' workplace learning,  the following variables were used:  *setting the goals for workplace learning periods*, *forms of guidance*,  *length of completed workplace learning periods*, and *students' self-assessment of their own work* The guidelines for workplace learning by the Finnish National Board of Education require that the learning goals for every workplace learning period should be derived from the curriculum. We studied the implementation of this requirement via a single statement: *"Before the workplace learning period I drew up my own workplace learning goals"* (the name of the variable is *setting the goals for WPL periods*). As mentioned above, educational practices were seen as including forms of guidance which take place at school or between the school and the workplace (i.e. *discussions with the teacher*, *discussions together with the teacher and the workplace trainer*, *assignments from the school*, and *learning journals*). Although all the students in our data were at the end of their studies, the duration of their completed workplace learning period

varied. Hence, we also used the total amount of completed workplace learning periods as an independent variable. In the questionnaire, students had to report how many workplace learning credits they had achieved (on a scale 1=1–5 credits, 2=6–10 credits, 3=11–15 credits, 4=16–20 credits, and 5=more than 20 credits). In addition, students' self-regulative skills have an important role in student learning (e.g. Boekaerts and Cascallar 2006; Boekaerts and Minnaert 2006; Pintrich 2004). In our study, the exercise of self-regulation was measured by asking students to what extent they had assessed their own work during their workplace learning periods, using a three-point scale (1=none, 2=some, 3=a great deal).

## RESULTS

### Research question 1: Explanations for students' workplace learning outcomes

The explanations for students' workplace learning outcomes were sought via regression analysis from variables described above (see Table 2). According to the results (Table 3), all three kinds of elements significantly explained the students' workplace learning outcomes: (1) *social and structural features of the workplace* (i.e. active membership, availability of individual guidance, and guidance concerning student's own development and assessment), (2) *educational practices* (i.e. integration between school learning and workplace learning, and self-assessment of one's own work ), and also (3) *student-related individual factors* (i.e. invention orientation, and learning orientation,). The regression model explains 50 percent of the variety of students' workplace learning outcomes. This degree of explanation is fairly high for this type of study. The phenomenon under study is quite complex because it is affected by many different factors, and these factors are connected to each other in extremely complex ways. In fact, such aspects mean that in studies of this kind, very high degrees of explanation are rarely discovered.

INSERT TABLE 3 ABOUT HERE

The largest explanatory factor was that of *active membership* which was (along with other factors) positively connected to students' workplace learning outcomes (Table 3). Active membership is one of the elements of social and structural features of the workplace. Thus one can say that the more students felt that they were able to function as active members of their workplace (i.e. having the possibility to influence the way things were done at the workplace, with regular workers asking their opinion and advice, and possibly learning from them), the more they were of the opinion that they were able to learn and develop during their workplace learning periods. The second biggest factor explaining students' workplace learning outcomes at work was the *integration between school learning and workplace learning*. This is an element of educational practices and it describes, at a very concrete level, the integration between the students' two different learning environments. It indicates that the closer the students felt the integration between school and workplace learning to be, the better were their workplace learning outcomes. The third and fourth largest explanatory factors were student-related individual factors: these involved motivational orientations (*invention and learning orientations*). The invention orientation demonstrates student's willingness to invent new solutions at work, whereas the learning orientation depicts the student's willingness (or motivation) to learn new things at work. The fifth explanatory factor was once again related to educational practices: *self-assessment of the student's own work,* which refers to the extent to which the students were required to reflect on and assess their own work during their placement. The sixth and seventh explanatory factors – *availability of individual guidance*, and

*guidance concerning the student's own development and assessment* – are elements of social features of the workplace. Both factors are connected to students' guidance at work.

All in all, the findings show that students' learning outcomes at work cannot be seen merely as consequences of individual factors such as student motivation (as has often been suggested). On the contrary, the most important factors for the success of students' workplace placements are, first of all, social circumstances of the workplace, and, secondly, the pedagogical arrangements – especially the integration of learning in the students' two different learning environments.

**Research question 2: The explanations for students' workplace learning outcomes in two vocational fields**

In order to compare two vocational fields which have demonstrated different workplace learning practices, we conducted a separate regression analyses for (i) technology and transport, and (ii) social services and health care. The explanations for students' workplace learning outcomes in the field of technology and transport can been seen in Table 4, and in the field of social services and health care in Table 5. According to these results, all three kinds of elements (i.e student-related individual factors, the social and structural features of the workplaces, and educational practices) explained the students' workplace learning outcomes in both fields. The regression model explains 49 percent of the variety of students' workplace learning outcomes in the field of technology and transport, and 50 percent in the field of social services and health care.

INSERT TABLE 4 AND 5 ABOUT HERE

The important role of the social features of the workplace was common to the both fields, although these features varied somewhat between the fields in terms of their contents and order. In the field of technology and transport, three out of the four largest explanatory factors belonged to the social features of the workplace (i.e. active membership, guidance concerning the student's own development and assessment, and the availability of individual guidance). Active membership was the largest explanatory factor. In the field of social services and health care, three out of the five largest explanatory factors belonged to the social features of the workplace (i.e. availability of individual guidance, active membership, and discussion with employees). The availability of individual guidance was the most important explanatory factor for the students' workplace learning outcomes. The outstanding role of one educational practice, namely the integration between school learning and workplace learning, was common to both fields; it was the second largest explanatory factor in the field of social services and health care, and the third largest explanatory factor in the field of technology and transport.

There were also differences between the fields in the explanatory factors regarding student-related individual factors and educational practices. In the field of technology and transport, three out of all seven explanatory factors were student-related individual factors, whereas in the field of social services and health care, just one student-related individual factor functioned as an explanatory factor. The learning orientation was the biggest student-related individual factor in the field of technology and transport, but invention and initiative orientations also had an important role. The latter of these motivational orientations involves students' willingness to act on their own initiative. In the field of social services and health care, by contrast, only one student-related individual factor, namely invention orientation, emerged among the most important explanatory factors. It is notable that in the field of social services and health care, three out of all seven explanatory factors were

elements of educational practices, while in the field of technology and transport only one out of all the explanatory factors was related to educational practices. The integration between school learning and workplace learning mentioned above was the common explanatory factor in both fields. In the field of social services and health care, there were also two other educational practices, namely setting the goals for workplace learning, and discussion with teachers. Both of them pertain strongly to the workplace learning system of Finnish VET. For example, according to the demands of the workplace learning system, the goals (which are derived from the curriculum) are set for every workplace learning period, and the variable "setting the goals for WPL learning" represents precisely this. "Discussion with teachers" is connected to the guidance that students receive from their teachers during workplace learning periods. Although the workplace trainers have the main responsibility for students' guidance during workplace learning, the teachers, too, are expected to visit students during their workplace learning periods. This form of discussion or guidance is connected to these visits.

All in all, the social features of the workplace and educational practices are the most important explanatory factors of social services and health care students' learning at work. By contrast, student-related individual factors did not appear to play such an important role for these students. Similarly, in the field of technology and transport, the social features of the workplace explained most of the students' learning at work. However, among technology and transport students (unlike the social services and health students), student-related individual factors such as motivation for learning had a further important role for learning at work – as also had educational practices, which emerged with a weaker – but not unimportant – role in this field.


## CONCLUSIONS AND DISCUSSION

The explanations for students' workplace learning outcomes were sought from three different aspects: (1) student-related individual factors, (2) social and structural features of the workplace, and (3) educational practices. The results, derived from regression analysis, showed that all these proved to be crucial elements for students' workplace learning. This implies that all these factors must be taken into consideration when designing and implementing students' learning periods in workplaces. Below, the findings will be discussed in more detail, and suggestions will be put forward for organizing students' learning at work. In particular, the results from the field of social services and health care will be utilized, on the grounds that previous studies have shown this field to be more advanced than other vocational fields, for example in terms of having more supportive and expansive practices for learning and vocational development than other fields (e.g. Virtanen, Tynjälä, and Stenström 2008). Furthermore, in this field, the students have reported higher levels of learning outcomes in terms of vocational identity development than students in other vocational fields (Virtanen, Tynjälä, and Stenström 2008). In addition, the present study showed that the field of social services and health care differed clearly from the other field examined, i.e. that of technology and transport.

The social features of the workplace were shown to be important elements for students' learning at work. In the workplace, the learning environment that supports the learning of the student must be constructed so that the student can participate in different tasks and work actively. For example, the students must be given the opportunity to influence the way in which things are done in the workplace. A parallel finding has been obtained among employees; the richest opportunities for participation in the workplace enable the powerful development of employees (e.g. Billett 2001; Edwards 2007; Edwards and Mackenzie 2005; Fuller and Unwin 2004). In addition to ensuring active participation, learning environments in workplaces should be safe, and should make students'

professional development possible: the student has to know that guidance is available when required (see also Eteläpelto et al. 2005). Guidance discussion between the student and the workplace trainer should be focused especially on matters which are related to students' professional development and assessment. All in all, the student must be treated on a par with other employees, and given possibilities to do and act in the workplace. Nevertheless, students are learners, not professionals in their field, and hence their professional development should be supported with different forms of guidance.

In addition to the social features of workplaces, educational practices seem to have a significant role. Educational practices refer to the various pedagogical solutions and operations which the school and workplace use to support learning. Among these practices, concrete integration between school learning and workplace learning was shown to be crucial for learning. In other words, the closer the integration between school learning and workplace learning, the better the students assessed their workplace learning outcomes. In the field of social services and health care in particular, educational practices were emphasized. In addition to the integration of school learning and workplace learning, the setting of goals for workplace learning periods and discussions with teachers emerged as important pedagogical elements in this field. Setting goals for workplace learning periods is a signal that the student is not sent to the workplace to practise only what (s)he has learnt at school, and that (s)he is expected to learn some of the requirements of his/her vocational qualification at the workplace (instead of the school). The aspect of discussions with teachers further emphasizes that the student has not been forgotten during the workplace learning period, or left alone in the workplace; hence there seems to be the need for the teacher to visit during the workplace learning period. Both of these latter aspects are strongly present in the workplace learning system of Finnish VET.

Overall, in the field of social services and health care, the concrete integration of school learning and workplace learning came up very strongly as an explanatory factor for students' workplace learning outcomes. This finding is in line with our earlier studies, which show that the integration and the learning outcomes are higher in the field of social services and health care than in other vocational fields (Virtanen, Tynjälä, and Stenström 2008; Virtanen, Tynjälä, and Collin 2009). Thus, these findings taken together show that through their pedagogical practices, schools and teachers have a critical role in the success of student learning in the workplace. It is especially important to develop the kinds of practices that are described in the connective model of work experience (Griffiths and Guile 2003; Guile and Griffiths 2001) and in the model of integrative pedagogy (e.g. Tynjälä 2008, 2009; Heikkinen, Tynjälä and Kiviniemi, , 2011). Furthermore, student guidance should not be left merely to the workplace; teachers need to be involved, especially in setting the learning goals and in discussion with students during workplace learning.

Student-related individual factors were an interesting phenomenon. Among the students as a whole, two student-related individual factors explained students' workplace learning outcomes, namely invention and learning orientations. By contrast, in the field of social services and health care, just one student-related individual factor (i.e. invention orientation) was found among the explanatory factors. Thus our findings suggest that when workplace learning is carried out in the way described in the guidelines of the Finnish National Board of Education (e.g. Vocational education and training in Finland 2011), and when school learning and workplace learning are integrated, student-related individual factors such as students' learning motivation do not play a very significant role. It appears that what strongly supports students' learning at work is in fact the workplace learning system, including systematic goal setting, guidance, and assessment. Invention orientation was the single student-related explanatory factor in the field of social services and health care; this implies that students should be encouraged to be active and venturesome, because those students who had

the energy to act and try things seemed also to be the ones who were most likely to learn and to develop themselves professionally. Hence, taken as a whole, the results give some support to the notion that the new workplace learning system is workable and successful, and that when it is carried out according to the demands set for it, the students' learning outcomes are strong and positive.

Interestingly, some elements which have been shown to be important features for employees' workplace learning, such as the structural features of the workplace did not come up in this study. For example, the size of the workplace did not influence students' learning outcomes in the workplace (cf. Smith 2002; Chiaburu and Marinova 2005). Another interesting discrepancy was apparent in relation to previous studies showing that – among students and others – prior work experience is conducive to workplace learning (e.g. Collin 2004; Collin and Paloniemi 2008; Virtanen, Tynjälä, and Collin 2009). In the present study, students' prior work experience did not seem to have a significant influence on students' workplace learning outcomes.

As a conclusion – as has also been emphasized in recent studies on employees' workplace learning – both individual and social factors play a significant role in students' workplace learning (e.g. Eteläpelto and Saarinen 2006; Harteis and Billett 2008; Hodkinson, Biesta, and James 2008; Lehtinen 2008; Tynjälä 2008, 2009). This study also showed in a very striking way the importance of the integration of students' different learning environments for their learning at work. From the perspective of students' learning and vocational development at work, the way in which the learning environments of school and working life are connected takes on a crucial role. The closer the perceived integration between school learning and workplace learning, the more positive is the students' assessment of their learning of various skills, and also their assessment of their professional identity development during their workplace learning periods.

This study gives hints as to how students' learning periods and situations in the world of work should be organized. In particular, it highlights the importance of the integration of learning in students' different learning environments, i.e. school and work. These findings can be also utilized in the development of employees' workplace learning. While workplace learning is seen informal and unguided, some formalization and pedagogization would make it more visible (e.g. Billett 2002; Evans et al. 2006). Hence, similar to the workplace learning system of Finnish VET, *employees'* workplace learning, too, might involve the setting of goals (through discussion between the employee and the employer). In addition, the employee could be guided to reach these goals, and the employees' learning could be assessed. This assessment could be started with self-assessment by the employee, since this procedure has been shown to be an element in the professional growth of the individual, and since making visible individual strengths and weaknesses has been seen as essential for individuals' awareness of their own professional identity (e.g. Cohen-Scali 2003).

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# Appendix

Table 6. A summary of the aggregate scales making up the independent variables used in the regression analysis.

| AGGREGATE SCALES | CRONBACH'S ALPHA | ITEMS | CORRELATION OF THE ITEM WITH THE AGGREGATE SCALE |
|---|---|---|---|
| **STUDENTS' MOTIVATIONAL ORIENTATIONS** | | | |
| Achievement orientation | 0.66 | - It was important to me to do well in the workplace learning. | 0.57 |
| | | - It is important to me to receive good marks at school. | 0.44 |
| | | - It was important for me to complete my tasks in a way that made my trainer fully satisfied. | 0.42 |
| Avoidance orientation | 0.56 | - I did not like to attempt very difficult tasks, preferring to leave them to more experienced people. | 0.39 |
| | | - I was worried about what the other people in the workplace thought about me. | 0.39 |
| **STUDENTS' EXPERIENCES OF WORK COMMUNITIES** | | | |
| Social and interactional support* | 0.80 | - Collaboration with other people was difficult. | 0.68 |
| | | - Fellow workers did not talk about essential things. | 0.64 |
| | | - Sometimes I had the feeling that I was being bullied at the workplace. | 0.59 |
| | | - I often found myself alone with my questions and work-related problems. | 0.55 |
| Availability of individual guidance | 0.79 | - Collaboration with the workplace trainer went well. | 0.67 |
| | | - The workplace trainer was available when I needed him/her. | 0.58 |
| | | - It did not take me long to learn the rules of the game at the workplace. | 0.57 |
| | | - I was treated the same as the other workers. | 0.57 |
| Active membership | 0.79 | - I was asked about my opinion and for advice. | 0.66 |
| | | - I was able to influence the way in which things were done at the workplace. | 0.64 |
| | | - At the workplace the other people learned from me too. | 0.61 |
| **CONTENT OF GUIDANCE** | | | |
| Guidance concerning the work and work environment | 0.83 | - Guidance on and supervision of work tasks | 0.66 |
| | | - Guidance on tools and equipment | 0.65 |
| | | - Induction into the work environment and community | 0.62 |
| | | - Getting to know my fellow workers | 0.61 |
| | | - Instructions concerning occupational safety | 0.58 |

| | | | |
|---|---|---|---|
| Guidance concerning students' development and assessment | 0.79 | - Discussion about how the student could develop his/her occupational competence in the future, or about how students could acquire further competencies and qualifications | 0.58 |
| | | - Feedback on and assessment of the quality of the student's work performance | 0.57 |
| | | - Guidance on the self-assessment of the student's work performance | 0.55 |

**INTERACTION BETWEEN SCHOOL LEARNING AND WORKPLACE LEARNING**

| | | | |
|---|---|---|---|
| Integration between school learning and workplace learning | 0.69 | - Situations that arise during workplace learning periods have been discussed during lessons in vocational subjects. | 0.55 |
| | | - During the workplace learning periods I was required to apply theoretical knowledge learned at school. | 0.52 |
| | | - Classroom instruction covered topics that were very useful during the workplace learning periods. | 0.46 |
| | | - Situations that arise during workplace learning periods have been discussed also during lessons in common subjects. | 0.38 |
| | | - Workplace learning periods included assignments from the school. | 0.35 |
| Connection between school and work | 0.66 | - Workplace learning and school learning are very well integrated with each other. | 0.47 |
| | | - The people at school do not seem to be very clear about what goes on in the workplace learning. (inverted) | 0.44 |
| | | - It seemed to me that the educational establishment and the workplace cooperate well. | 0.44 |
| | | - There was little relation between the classroom instruction and workplace learning. (inverted) | 0.43 |

* For the present study, the statements which formed this aggregate scale (social and interactive support) were transformed from negative forms to positive forms.

Table 1. The aggregate scale for the students' workplace learning outcomes.

| Cronbach's alpha | Items (35) | Correlation of the item with the aggregate scale |
|---|---|---|
| | - Initiative | 0.73 |
| 0.95 | - Ability to operate in new situations | 0.72 |
| | - Self-confidence | 0.72 |
| | - Ability to solve occupationally-related problems | 0.71 |
| | - Planning and developing of one's own work | 0.70 |
| | - Assessing one's own work | 0.70 |
| | - Interaction skills | 0.69 |
| | - Learning at work | 0.68 |
| | - Oral communication skills | 0.68 |
| | - Inventiveness and developing new ideas | 0.68 |
| | - Collaboration skills | 0.67 |
| | - Communication skills | 0.66 |
| | - Planning one's career | 0.63 |
| | - Teamwork skills | 0.62 |
| | - Basic skills of one's own occupation | 0.62 |
| | - Critical thinking skills | 0.62 |
| | - I got ideas about how to develop my work. | 0.61 |
| | - Gaining workplace practices | 0.60 |
| | - Having an overall picture of one's own field | 0.60 |
| | - Working independently | 0.60 |
| | - Presentation skills | 0.59 |
| | - Written communication skills | 0.56 |
| | - The workplace learning period increased my interest in my work. | 0.55 |
| | - I am starting to feel that I am a member of my occupational group. | 0.51 |
| | - During the workplace learning period I had a feeling that I was realizing my own dream. | 0.51 |
| | - The workplace taught me to think critically. | 0.50 |
| | - I know now what my strengths and weaknesses are. | 0.46 |
| | - Routine skills | 0.46 |
| | - I understand that I must follow the developments in my own field. | 0.46 |
| | - I became aware that there are other ways to learn than those at the school. | 0.44 |
| | - Computer skills | 0.38 |
| | - Occupational safety issues | 0.37 |
| | - The workplace learning period increased my interest in my work. | 0.35 |
| | - I was very keen on my work.* | 0.34 |
| | - Using a foreign language in the work | 0.33 |

* For the present study, this statement was transformed from the negative form to the positive form.

Table 2. Independent variables of the regression model

| Student-related individual factors | Social and structural features of the workplace | Educational practices |
|---|---|---|
| **Students' motivational orientations**<br>- achievement orientation<br>- learning orientation<br>- invention orientation<br>- initiative orientation<br>- avoidance orientation<br><br>**Students' prior work experiences** | **Students' experiences of work communities**<br>- social and interactional support<br>- availability of individual guidance<br>- active membership<br><br>**Discussion at work**<br>- with the workplace trainer<br>- with other employee<br><br>**Content of guidance discussions**<br>- guidance concerning the work and the work environment<br>- guidance concerning the student's own development and assessment<br><br>**Size of the workplace** | **Integration of school learning and workplace learning**<br>- integration between school learning and workplace learning<br>-connection between school and work<br><br>**Different forms of guidance**<br>- discussion with the teacher<br>- discussion together with the teacher and the workplace trainer<br>- assignments from the school<br>- learning journals<br><br>**Length of completed workplace learning periods**<br><br>**Setting the goals for workplace learning periods**<br><br>**Students' self-assessment of their own work** |

Table 3. The explanations for students' workplace learning outcomes. The degree of explanation 50 %.

| R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig.F Change |
|---|---|---|---|---|---|---|---|---|
| .706 | .499 | .496 | .42264 | .015 | 33.073 | 1 | 1074 | .000 |

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | | | Tolerance | VIF |
| - Active membership | .181 | .020 | .225 | 8.968 | .000 | .739 | 1.352 |
| - Intergration between school learning and workplace learning | .200 | .024 | .196 | 8.174 | .000 | .811 | 1.234 |
| - Invention orientation | .174 | .021 | .196 | 8.200 | .000 | .817 | 1.224 |
| - Learning orientation | .169 | .025 | .161 | 6.749 | .000 | .821 | 1.219 |
| - Self-assessment of one's own work | .162 | .026 | .149 | 6.261 | .000 | .827 | 1.210 |
| - Availability of individual guidance | .148 | .026 | .147 | 5.751 | .000 | .718 | 1.393 |
| - Guidance concerning the student's own development and assessment | .105 | .020 | .126 | 5.216 | .000 | .798 | 1.254 |

Table 4. The explanations for students' workplace learning outcomes in the field of technology and transport. The degree of explanation 49 %.

| R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig.F Change |
|---|---|---|---|---|---|---|---|---|
| .697 | .486 | .478 | .42058 | .016 | 15.661 | 1 | 494 | .000 |

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | | | Tolerance | VIF |
| - Active membership | .185 | .029 | .236 | 6.329 | .000 | .748 | 1.338 |
| - Guidance concerning the student's own development and assessment | .161 | .029 | .196 | 5.578 | .000 | .844 | 1.185 |
| - Integration between school learning and workplace learning | .204 | .036 | .192 | 5.655 | .000 | .899 | 1.113 |
| - Availability of individual guidance | .185 | .039 | .183 | 4.798 | .000 | .714 | 1.401 |
| -Learning orientation | .146 | .033 | .160 | 4.403 | .000 | .785 | 1.273 |
| - Invention orientation | .131 | .033 | .147 | 3.981 | .000 | .767 | 1.304 |
| - Initiative orientation | .088 | .022 | .135 | 5.957 | .000 | .895 | 1.117 |

Table 5. The explanations for students' workplace learning outcomes in the field of social services and health care. The degree of explanation 50 %.

| R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig.F Change |
|---|---|---|---|---|---|---|---|---|
| .704 | .496 | .482 | .40627 | .008 | 3.882 | 1 | 247 | .050 |

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | | | Tolerance | VIF |
| - Availability of individual guidance | .190 | .047 | .215 | 4.054 | .000 | .722 | 1.386 |
| - Integration between school learning and workplace learning | .216 | .054 | .198 | 3.985 | .000 | .830 | 1.206 |
| - Active membership | .152 | .045 | .197 | 3.391 | .001 | .605 | 1.653 |
| - Invention orientation | .162 | .042 | .193 | 3.831 | .000 | .802 | 1.247 |
| - Discussion with employees | .138 | .042 | .162 | 3.313 | .001 | .849 | 1.178 |
| - Setting the goals for WPL periods | .093 | .033 | .137 | 2.812 | .005 | .862 | 1.160 |
| - Discussion with teacher | .145 | .073 | .091 | 1.970 | .050 | .965 | 1.036 |