Teachers' perceptions on relevant upper-secondary vocational graduate competencies and their development
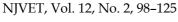
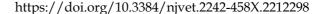## Sami Löfgren, Liisa Ilomäki & Auli Toom

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Abstract

Finnish initial vocational education and training aims for graduate employability by emphasising self-directed learning and workplace learning. However, little is known about what competencies teachers consider relevant for graduates, how teachers address competencies in their instruction and how they perceive the benefits of workplace learning. Therefore, this study aims to highlight teachers' perceptions and their practices on these topics. This is a qualitative interview study conducted in cooperation with a large Finnish vocational education provider. Participants of the study were teachers in automotive engineering, electrical and automation engineering, mechanical and metal engineering, and building service technology. The data were collected with semi-structured qualitative interviews and analysed using qualitative, abductive content analysis. The research findings indicate that teachers consider fundamental domain-specific competencies and work-related attitudes paramount for graduates as these promote professional expertise and employability. Secondly, teachers prefer to teach domain-specific competencies. However, the emergence of self-directed learning demands that teachers be pedagogically competent. Thirdly, teachers deem workplace learning beneficial but also consider that school may offer more equal and versatile education opportunities for everyone. The research findings enrich the scientific discussion on vocational graduate competency needs and vocational teaching and support the development of vocational education systems.

Keywords: vocational education and training, competence, labour market, teaching

Introduction

Fluctuation of the international economy, globalisation, innovative educational technology and more diverse student populations affect vocational teachers' work worldwide (Jossberger et al., 2010). Quite often, governments have reacted by imposing reforms based on competence-based education and self-directed learning without consulting educators (Billett, 2014) and collaborating with them.

Consequently, more knowledge is needed on how teachers perceive their tasks and relevant learning contents for students (Billett, 2014; Nylund & Gudmundson, 2017), advantageous instructional structures (Löfgren et al., 2020), attitude towards self-directed learning in their field and readiness to support it (Jossberger et al., 2010) and professionalism in their trades (Köpsén, 2014). This is crucial as vocational teachers are gatekeepers to employment for their students: teachers mediate curricular contents and industry competence expectations, shape what students learn and ultimately contribute to graduate employability (Berner, 2010; Billett, 2014).

In this study, we aim to explore how initial vocational education and training (IVET) teachers perceive graduate competency requirements and competency development. We address three research questions: How do teachers perceive upper-secondary IVET graduate competencies? Which instructional practices do teachers employ to teach competencies? How do teachers perceive the effect of workplace learning on students' learning of competencies?

Essential competencies for upper secondary IVET graduates

European vocational education aspires for continuous professional development and labour mobility (Mulder & Winterton, 2017). These objectives shape the way competence is understood within IVET. Competence refers to one's overall ability to adapt and act; it is further divided into several, integrated sub-clusters of knowledge, skills and attitudes, labelled as competencies (singular 'competency', see Blömeke et al., 2015; Mulder & Winterton, 2017; Toom, 2017). *Domain-specific competencies* illustrate competency clusters related to certain trade-specific job tasks (e.g., Gekara & Snell, 2018; Mulder, 2014), for instance, turning or welding. *Domain-general competencies* refer to more generalisable competency clusters that allow workers to adapt at different stages of their professional careers (Mulder, 2014; Nägele & Stalder, 2017), for example social competency and motivation to work. Both domain-specific and -general competencies are pivotal for professional work because only together they enable an individual to cope with the daily work and to adapt and act when necessary (Mulder, 2014). In addition, especially domain-general competencies should not be seen only as a means to excel in the world of work as they can also help one to pursue a good life (Mulder, 2014).

Although scholars agree to some extent about the nature of the concept of competence, its exact definition and content stay uncertain and ambiguous (Blömeke et al., 2015; Mulder, 2014; Nägele & Stalder, 2017; Toom, 2017). It is debatable, for example, how competence affects performance: is it the competence as a whole (i.e., a holistic view), or do single knowledge, skills and attitudes determine whether one succeeds (i.e., an analytic view; see Blömeke et al., 2015; Mulder, 2014)? Mulder (2014) argues that the discussion about competence covers three general perspectives. Behaviouristic functionalism is deeply analytic and stresses the definition, selection and training of single, even minuscule domain-specific competencies (Mulder, 2014, p. 128). Integrated occupationalism is both analytic and holistic and acknowledges also domain-general competencies; still, it tends to overemphasise workplace competency needs (Mulder, 2014, p. 129). Situated professionalism is the most holistic perspective, assuming that an individual's competence acquires its meaning only in a specific community of practice (Mulder, 2014, p. 130; see also Lave & Wenger, 1991). It is also criticised as being too imprecise for the definition and selection of curricular learning contents (Mulder, 2014).

Analytic and holistic approaches can be seen as a continuum and usually the scientific debates as well as the vocational education systems combine features from the three perspectives (Blömeke et al., 2015; Mulder, 2014). For example, situated professionalism has strongly influenced the current understanding of workplace learning, which is an important element in practically all vocational education systems (Berner, 2010; Mulder, 2014). Also today, (technical) vocational teachers train minuscule skills at school so that students could be more work-ready and confident when they start learning at the workplace (Berner, 2010). Still, due to the societal aspirations for graduate employability, labour mobility and professional development, the occupationalistic viewpoint stands out emphasising that curricular contents should primarily be based on workplace competency needs (Mulder, 2014; Mulder & Winterton, 2017).

To become employed, vocational students should not only learn the theoretical knowledge of their trades but also manual skills to apply their knowledge (Berner, 2010; Gekara & Snell, 2018). Still, profound domain-specific competencies may be unrealistic expectations (e.g., Köpsén, 2014; Pylväs et al., 2018). Rather, graduate job seekers should show potential for the trade and distinguish themselves with domain-general competencies (Löfgren et al., 2020). There are multiple frameworks illustrating important competencies but these may be too approximate and distant to offer insights into trade-specific competency needs (Mulder, 2014; Mulder & Winterton, 2017). Thus, in the following, we focus specifically on technical-trade IVET graduate competency expectations identified in earlier research and elaborate the views of employers (Löfgren et al., 2020) and teachers (Berner, 2010; Vähäsantanen & Hämäläinen, 2018).

To access professional communities, IVET graduates need *work-related attitudes*, for example adherence to company rules and working times, tidiness, initiative, and a willingness to help (Löfgren et al., 2020; Nägele & Stalder, 2017; Pylväs et al., 2018; Vähäsantanen & Hämäläinen, 2018). *Social competency* serves the same aim. It can emerge as respect, empathy, friendliness and good manners, but also as skilled communication and collaboration (Berner, 2010; Vähäsantanen & Hämäläinen, 2018). Besides, IVET graduates should show *professional self-perception* and evaluate themselves honestly but positively (Van Houtte et al., 2012). Young graduates often consider their professional proficiency and status vulnerable, which results in being overly eager or cautious (Berner, 2010; Löfgren et al., 2020).

To keep up with working and constant development, IVET graduates need *motivation to work* (Pylväs et al., 2018). Besides, they need *learning competency*: 1) Motivation to learn includes openness and alertness for learning opportunities (Berner, 2010; Jossberger et al., 2010; Nägele & Stalder, 2017). 2) Ability to learn encompasses various metacognitive skills paramount for modern self-directed learners; this includes learning need detection, goal setting and self-assessment (De Bruijn & Leeman, 2011; Jossberger et al., 2010). However, these are not innate but require active guidance from teachers (Jossberger et al., 2010).

Moreover, *language competency* is necessary to read and understand equipment manuals (Berner, 2010; Löfgren et al., 2020). *Mathematical competency* enables logical, abstract and three-dimensional thinking, which is appreciated in the technical trades (Berner, 2010). Such general disciplines as languages and mathematics are also important *per se* as they help to understand why the work has to be done in a certain way and not just how (cf. Bakker & Akkerman, 2019). Unfortunately, general disciplines within technical vocational programmes have also been undervalued because they do not necessarily produce direct workplace relevance (Bakker & Akkerman, 2019; see also Löfgren et al., 2020). This challenges especially teachers and educational institutions to highlight the value of general disciplines as a means for students' personal growth, professional development, eligibility for future studies and lifelong learning (Mulder, 2014; Niemi & Rosvall, 2013; OECD, 2020). Such teacher arguments can also balance the possibly short-sighted and instrumental industry competency needs (cf. Mulder, 2014). Moreover, due to automation and inevitable alterations of the labour market competency needs, OECD (2020) recommends that IVET institutions ensure that IVET graduates can study later on. Overall, earlier research shows that technical-trade IVET students are heterogeneous in terms of their competencies (Löfgren et al., 2020; Niemi & Rosvall, 2013; Vähäsantanen & Hämäläinen, 2018). This raises questions about the organisation of successful vocational education.

Characteristics of vocational schooling

Vocational studies usually take place at a workplace or school. Largely the same competencies can be taught at either location (Berner, 2010; Köpsén, 2014). In Finland and Sweden, vocational studies used to take place mostly at school but workplace learning (WPL) has increased since the 2000s (Mårtensson et al., 2019; Rintala et al., 2018). WPL is commonly characterised as a situated learning process, where novices participate in the actions of communities of practice, gradually acquire its membership and learn vocational proficiency (Berner, 2010; Lave & Wenger, 1991; Mulder, 2014). WPL environments may offer students experience with advanced equipment, complex customer assignments (see Vähäsantanen & Hämäläinen, 2018) and employment (Berner, 2010; Löfgren et al., 2020). However, firms compete on an open market. Many lack the time to guide apprentices and assign only organisation-specific and monotonous tasks (Gekara & Snell, 2018; Isopahkala-Bouret, 2010; Vähäsantanen & Hämäläinen, 2018). Besides, employers provide WPL places to screen potential employees; therefore, many prefer motivated and skilled apprentices (Berner, 2010; Pylväs et al., 2018).

Within school-based learning, novices conduct trade-specific learning assignments with professional equipment under teachers' guidance (Berner, 2010). Vocational schools do not compete for customers. They may consider various industry competency needs and provide students with time to practise (Berner, 2010; Jossberger et al., 2010; Vähäsantanen & Hämäläinen, 2018). IVET teachers are usually both experienced craftspersons and trained educators so they may scaffold individual learning assignments for the weak and unmotivated (Berner, 2010; Billett, 2014; Köpsén, 2014). However, proponents of WPL have criticised school-based learning presuming that the school mediates competencies relevant only in the school environment and not in professional practice (Berner, 2010). Some employers offering WPL periods have even questioned the domain-specific expertise of IVET teachers (Vähäsantanen et al., 2009).

Despite their differences, workplace learning (WPL) and school may complement each other (Bakker & Akkerman, 2019). Their interplay creates a boundary zone between school and work, where students, teachers and workplace supervisors overcome various social and cultural boundaries between school and workplace, learn important competencies and where teachers act as gatekeepers to work (Bakker & Akkerman, 2019; Berner, 2010; Köpsén, 2014; Mårtensson et al., 2019). According to Bakker and Akkerman (2019) teachers and workplace supervisors may instigate student learning through boundary crossing when four interrelated processes are involved.

At start, teachers and workplace supervisors should together *identify* their tasks, roles and responsibilities so that they could conceive how they can complement each other when advancing student learning (Bakker & Akkerman, 2019). Then, they should agree on and align practices that help them to *coordinate*

students' learning processes (Bakker & Akkerman, 2019). As teachers and workplace supervisors interact, they become aware of their own and their counterparts' perspectives; thus, they may engage in *mutual reflection*, which helps them to further reconcile different perspectives for the sake of student learning and also for their personal development (Bakker & Akkerman, 2019). Consequently, boundary crossing may *transform* prevailing instructional structures into more effective ones or novice students towards more mature professional thinkers and actors (Bakker & Akkerman, 2019).

Teachers face a contradictory challenge when coordinating student's boundary crossing. On the one hand, they should preserve the boundary and pay attention to students' pedagogical fostering (Berner, 2010; Köpsén, 2014). As teachers support and encourage students and create a safe atmosphere, they reinforce students' learning processes (Köpsén, 2014). On the other hand, industry expects teachers to remove the boundary by advancing professional growth and preparing students for the world of work (Berner, 2010; Köpsén, 2014). Teachers as experienced professionals themselves should mediate domain-specific expertise to students, give examples of professional work and show instances of craftsperson habitus; that is, they should explain how a professional looks, feels, acts and communicates (Berner, 2010).

Teachers' previous work experience and studies affect whether they identify themselves as craftspersons or pedagogues (Berner, 2010; Mårtensson et al., 2019; Nylund & Gudmundson, 2017). Craftspersons value domain-specific competencies; pedagogues also value pedagogical methods, critical thinking and such domain-general subjects as languages and mathematics (Nylund & Gudmundson, 2017). Technical-trade teachers traditionally prefer the craftsperson habitus and some question pedagogical training, although 'common sense' cannot substitute for it (Berner, 2010; Köpsén, 2014; Nylund & Gudmundson, 2017). The emergence of competence-based education further affects teacher habitus and steers the focus from teaching to coaching in European IVET systems (e.g., De Bruijn & Leeman, 2011; Isopahkala-Bouret, 2010). Examples from Finland are given in the following.

Recent developments in the Finnish IVET

Until the 1980s, Finnish initial vocational education and training (IVET) was a relatively school-based system. Since the 1990s, it has been criticised for weak support for graduates' transition from school to work. Beginning in the early 2000s, competence-based education and workplace learning were gradually implemented, aiming to strengthen the workplace relevance of IVET and competitiveness of the Finnish economy (see Isopahkala-Bouret, 2010; Nylund & Gudmundson, 2017; Rintala et al., 2018).

Competence-based education prefers workplace learning and individualised, self-directed learning to collective, teacher-led schooling (Jossberger et al., 2010;

Rintala et al., 2018). It turned teachers into coaches who organise learning and help students to reflect on their learning outcomes (De Bruijn & Leeman, 2011; Isopahkala-Bouret, 2010). The latest legislative reform (2015–2018) cemented competence-based education and workplace learning (WPL) as a foundation of Finnish IVET but also emphasised its workplace relevance through customer-oriented and demand-driven training (Ministry of Education and Culture, 2018). Local education providers gained high autonomy to steer their activities but their state funding was coupled with student graduation and employment rates (Ministry of Education and Culture, 2018).

Students in the current Finnish IVET can form highly individualised learning paths but they are also expected to be relatively self-directed learners (Ministry of Education and Culture, 2018; Rintala et al., 2018). In fact, cooperation and coordination are needed to ensure that students can connect competencies they learn when crossing the boundaries between school and workplace (Bakker & Akkerman, 2019). If students cannot reflect and connect, what they have learnt remains inert; thus, the pursued quality of vocational training also remains elusive (Bakker & Akkerman, 2019).

Workplace relevance of vocational curricular contents and instructional structures may be reasonable when graduate employability is to be furthered (cf. Isopahkala-Bouret, 2010; Rintala et al., 2018). However, depending on the local culture, workplace relevance should not be the sole purpose of vocational education. In fact, Finland and other Nordic countries have traditionally upheld a universalistic VET culture, where students are supported both in their professional growth and in their personal growth into adulthood and citizenship (Virolainen & Stenström, 2014). Implementation of competence-based education and excessive workplace learning may mean that students only focus on learning organisation-specific job tasks (Gekara & Snell, 2018; Isopahkala-Bouret, 2010; Pylväs et al., 2018; Vähäsantanen & Hämäläinen, 2018). Competence-based education may suit better liberal VET cultures (e.g., UK) where schooling primarily aims to educate workers into specific positions in different firms; however, liberal VET cultures also pay less attention to students' professional versatility and social inclusion (Virolainen & Stenström, 2014).

Furthermore, successful competence development requires that the aspired knowledge, skills and attitudes are precisely defined because expectations differ between and within economic sectors and organisations (Mulder, 2014; Nägele & Stalder, 2017). To organise meaningful vocational education that responds to local competency needs and prepares students for future studies and a good life, such actual practitioners as teachers, students and local stakeholders must be consulted (Billett, 2014; Mulder, 2014).

Aim of the study

This study aims to determine how initial vocational education and training teachers perceive graduate competency requirements and competency development. We focus on the following research questions and their sub-questions.

1) How do teachers perceive the competencies of upper-secondary initial vocational education and training graduates?
   a) Which competencies do the teachers expect of graduates?
   b) What kind of experiences do the teachers have about graduates' accomplishment of competencies?
   c) Which competencies do the teachers themselves teach?
2) Which instructional practices do the teachers employ to teach competencies?
3) How do the teachers perceive workplace learning as it affects learning of competencies?
   a) Which competencies do the students develop during workplace learning?
   b) What conditions and teacher contributions are needed for students' successful workplace learning?

Method

Context

This study is carried out in collaboration with a large Finnish VET provider that offers approximately 50 three-year upper-secondary vocational qualification programmes and has annually some 10,000 students. The study was conducted in the technical vocational fields of automotive engineering, mechanical and metal engineering, building service technology, and electrical and automation engineering. These programmes offer education for some 600 students annually.

Focus on the technical-trade teachers enabled an in-depth scrutiny, given that teaching practices and cultures differ slightly among the vocational trades; still, the views of individual teachers always reflect some general issues in the school system concerned (Köpsén, 2014). Moreover, every above-mentioned vocational field has its own national and school-level curriculum. At the time of this study, there were reformations in progress. This stresses teachers' views.

Participants

The participants of this study (N=12, age: 48–62, mean: 48.6 years, two women and ten men) were recruited with the assistance of the VET provider according to the following criteria: 1) They instructed teenage (between ages 16–19) upper-secondary IVET students on domain-specific, substantial knowledge; 2) They taught in some of the four above-mentioned study programmes; and 3) They took

part voluntarily. They did not obtain incentives through their participation and were asked for written consent. Due to their voluntariness and serious dedication for this study, it is likely that the participants represented the most active members of the teaching staff. These teachers had the highest degree awarded in their vocational fields (a tertiary-grade engineering diploma), supplemented by pedagogical studies (60 credits) and at least three years of field-specific job experience (range: 3–30 years, mean: 17.2 years). Their teaching experience spanned from 5 to 25 years (mean: 14.4 years).

Procedure and materials

This is an explorative interview study (cf. Brinkmann & Kvale, 2018). We wanted to acquire a deeper understanding about vocational student competencies from the relatively understudied perspective of vocational teachers. Semi-structured, qualitative in-depth interviews provided an appropriate method for data collection. They allow the interviewees to react to the interviewer's questions relatively freely, conveying various experiences and meanings, also spontaneous viewpoints, while the uniform structure and themes of interviews ensure that all relevant topics are addressed with all interviewees (Brinkmann & Kvale, 2018).

Using background theories associated with the research questions, 13 interview questions were created, encompassing one orientation question and two broad themes: I) The demands of working life from the IVET graduates and II) Teacher roles, tasks and working-life connections. To avoid academic terms in the interview questions, the term 'competency' was replaced with 'readiness', which is its closest Finnish equivalent (cf. Löfgren et al., 2020). Last, a separate form was composed to collect background information, such as age, teaching experience and trade-specific job experience.

In May 2018, the first two pilot interviews were conducted; the first one was excluded from the final data. The second pilot interview was full-length and included. Based on the pilot interviews and the suggestions of interviewees, minor alterations to some questions and their order were made. In autumn 2018, the first author interviewed eleven other teachers. The length of interviews spanned from 60 to 120 minutes. All interviews were recorded and the first author transcribed them verbatim. The research data consist of 168 sheets of interview transcriptions from 12 vocational teachers.

Analysis

Qualitative content analysis was used to compress the data into a conceptual structure (Elo & Kyngäs, 2008; Schreier, 2012). Instead of sheer induction or deduction, qualitative content analysis was applied abductively. Iteration between data and theory helped to improve inference, scrutinise anomalies and find the most likely explanations for the data (Timmermans & Tavory, 2012).

The analysis was conducted with Atlas.ti 8 software. Interviewees' utterances were analysed as explicitly and semantically as possible, focusing on the content of their arguments (cf. Brinkmann & Kvale, 2018). A unit of analysis was a participant's expression implying one idea (Elo & Kyngäs, 2008); for instance, a single word, sentence or wider excerpt. Altogether 1,347 units were coded. The analysis comprised seven main dimensions, deriving from research questions (Schreier, 2012), under which the codes were allocated: competency expectations (RQ1.1); experiences on graduate competencies (RQ1.2); competencies as teaching contents (RQ1.3); instructional practices (RQ2); competencies learnt during workplace learning (RQ3.1) and conditions and teacher contributions for successful workplace learning (RQ3.2).

In the first part of analysis, the first author employed an existing conceptual categorisation for upper-secondary vocational graduate competency expectations used in a previous study (cf. Löfgren et al., 2020). Categorisation was applied with minor adjustments to deductively analyse competencies in this study (i.e., research questions 1.1–1.3 and 3.1); thus, juxtaposition of the current findings could be made with the previous ones. The authors later discussed and revised the competency categories. No major alterations were needed. The coding categories for competencies were as follows.

Domain-specific competencies encompass trade-specific substantial knowledge, manual skills and self-regulation (e.g., Gekara & Snell, 2018). Technological competency covers students' pre-study proficiency for technical trades, such as knowledge of technological concepts and manual dexterity (Autio, 2011). Professional self-perception embodies how students evaluate themselves as individuals and co-workers (Van Houtte et al., 2012). Work-related attitudes enable students to advance the cohesion and performance of their future communities of practice (e.g., Löfgren et al., 2020; Nägele & Stalder, 2017). Social competency encompasses correct, clear and courteous interaction with others (Löfgren et al., 2020; Vähäsantanen & Hämäläinen, 2018). Motivation to work includes students' willingness to work in general and interest in a specific trade and its job tasks (e.g., Pylväs et al., 2018). Learning competency covers motivation and ability to learn, including metacognitive skills to plan, conduct and assess one's learning (e.g., Jossberger et al., 2010; Löfgren et al., 2020). In addition, there were three competency categories that emerged from the data (Schreier, 2012, p. 89). Mathematical competency entails basic arithmetic and algebraic calculation skills and three-dimensional and logical thinking. Language competency encompasses proficiency in both the mother tongue and foreign languages. ICT competency includes necessary skills to employ computer and mobile-device software.

In the second part of analysis, the first author analysed participants' expressions on instructional practices (i.e., RQ2) and conditions and teacher contributions for successful workplace learning (i.e., RQ3.2). These were analysed abduc-

tively to create new coding categories that would explain the data and be consistent with the theoretical background (Timmermans & Tavory, 2012). At the beginning, the first author inductively coded participants' expressions and categorised the codes with descriptive names imitating the participants' expressions (Schreier, 2012). Then, the first author pushed these descriptive coding categories against the theoretical background to rearrange them into larger, consistent categories (Timmermans & Tavory, 2012). The authors discussed all categories and coding several times. Some coding categories were merged to create a more holistic conceptual structure. Finally, the subsequent coding categories emerged.

The coding categories for teachers' instructional practices (RQ2) were the following. Mission encompasses what teachers consider the purpose of their vocation (e.g., Berner, 2010; Köpsén, 2014). Fostering includes teachers' value-laden opinions on important pedagogic principles and student encounter, such as care and support, establishment of a learning atmosphere and student interaction (Köpsén, 2014). Professional development refers to teachers' interventions to advance students' professional growth (Berner, 2010; Köpsén, 2014). Scaffolding includes different didactical principles aimed to gradually increase student autonomy and decrease teacher supervision (e.g., De Bruijn & Leeman, 2011; Wood, Bruner & Ross, 1976). Deliberate practice refers to teacher-led and repetitive rehearsal of professional conduct, usually in authentic working environments (Jossberger et al., 2010).

Coding categories for conditions and teacher contributions for successful workplace learning (RQ3.2) were the following. Applicant screening describes workplace learning as a long-term recruiting process (Löfgren et al., 2020). Workplace heterogeneity refers to employers' various incentives to offer high quality workplace learning (e.g., Isopahkala-Bouret, 2010; Vähäsantanen & Hämäläinen, 2018). Coaching refers to teachers' efforts to train their students for workplace-learning (WPL) periods and selection of those students who may proceed to WPL (Isopahkala-Bouret, 2010; Mårtensson et al., 2019). Matching describes how teachers network with employers, plan apprenticeships with them and promote their students to employers so that both the employers and the students find their best counterpart (Mårtensson et al., 2019; Vähäsantanen et al., 2009). Assessment covers teachers' formative and summative assessment during WPL (Isopahkala-Bouret, 2010; Mårtensson et al., 2019). Teacher development portrays how teachers themselves may develop alongside the WPL supervision (Vähäsantanen et al., 2009; Vähäsantanen & Hämäläinen, 2018).

Results

The results reflect the views of research participants as unequivocally as possible and are presented following the order of the research questions. However, the results related to the first research question and its sub-questions (see Table 1)

are presented thematically, one competency domain at a time, to improve their comprehensibility. To elevate results transparency and to depict themes that participants addressed most, participant counts and coding frequencies are provided in Tables 1, 2, and 3.

RQ1: Teachers' perceptions on IVET graduate competencies

As Table 1 shows, all participants expected that graduates show basic *domain-specific competencies* and they also address these in their instruction. Teachers considered it natural that the youth as novices hardly understand comprehensive work processes but only specific tasks. Teachers emphasised that students should take work safety issues more seriously because tools and equipment are dangerous. Several teachers further reported on adolescents' *technological competency*. Many incoming students have not used tools in their free time. Those who have, develop rapidly. Last, several teachers addressed adolescents' *professional self-perception*. They said that many seek their peers' approval, even at the expense of their studies. Slow learners may disrupt others or they become stressed and anxious.

As regards *work-related attitudes*, several participants expected students to be responsible; for example, they expected them to adhere to company rules and care for their duties. Some adolescents are not used to work and may neglect these. However, only a few teachers explicitly reported that they address responsibility issues in their teaching. Most teachers expected conscientious attendance. Timetables and mobile phones are a constant challenge with teenage students. Many teachers declared that they try to tackle these issues. Some even call specific students every morning to get them to school. Teachers further reported that they trigger adolescents' personal initiative by insisting that students apply for apprenticeships and instruct them to ask for extra work. Last, several teachers complimented adolescents on their physical health. Many are sober and smoke-free. Unfortunately, some may use narcotics instead.

Many teachers addressed adolescents' *social competency*. They especially reported on their experiences of youth showing respect for others. They behave themselves politely and empathetically in principle but some litter or drift easily into quarrels. Some teachers reported that they also teach students basic manners. Teachers further expected communication and collaboration skills of students but only a couple mentioned that they teach students to collaborate, especially to consider other people and to give and ask for help.

Most participants experienced that adolescents are heterogeneously *motivated to work*, depending on the vocational field. Teachers from electrical and automation engineering appreciated students' motivation. Teachers from metalwork and machinery complained about the opposite. Thus, variation in student motivation may have its roots in the general reputation of vocational trades. Metal-

work lacks marketing and recognition; therefore, adolescents may ignore it. Several teachers tried to motivate their students to work, presented career opportunities and organised excursions to workplaces.

Table 1. Frequencies of categories related to teachers' competency perceptions (RQ1).

Competencies	RQ1.1 Expectations		RQ1.2 Experiences		RQ1.3 Teaching contents	
	%	f/N	%	f/N	%	f/N
Domain-specific competencies	59	122/10	5	16/8	40	101/12
Technological competency	-	-	3	10/6	-	-
Professional self-perception	-	-	5	17/8	-	-
Work-related attitudes	14	29/9	12	36/10	10	25/9
Responsibility	5	10/8	2	5/4	2	6/4
Conscientious attendance	6	13/9	6	18/9	4	9/6
Personal initiative	2	5/3	2	5/3	4	9/7
Maintenance of physical health	0	1/1	3	8/6	0	1/1
Social competency	10	21/8	3	10/8	4	11/5
Respect for others	1	3/3	2	7/7	3	7/5
Communication	4	8/5	0	1/1	-	-
Collaboration	5	10/5	1	2/2	2	4/2
Motivation to work	3	7/4	9	27/9	4	11/6
Learning competency	8	16/7	49	153/12	39	98/12
Motivation to learn	7	14/7	15	47/10	12	30/8
Ability to learn	1	2/2	34	106/11	27	68/12
Mathematical competency	4	9/5	7	22/10	2	6/5
Language competency	-	-	4	14/6	-	-
ICT competency	1	2/1	2	7/6	-	-
TOTAL	100.00	206	100.00	312	100.00	252

Note. f=frequency of analysis units. N=number of participants raising the issue (max. 12).
- = data not obtained.

Many participants expected the students to show *learning competency*. One teacher highlighted studies as 'a start and after ten years of learning at work you may comprehend one part of this trade'. Most teachers considered that students' motivation to learn varies a lot. Others 'could not care less', especially about mother tongue and mathematics. Others aspire for studies within higher education. A few teachers stated that some problems derive from primary-school instruction. Students are not required to do enough; thus, they learn to underachieve. Several participants declared that they try to trigger students' intrinsic motivation. Teachers plan interesting lessons, consider students' own ideas and keep up high expectations for learning results. They underlined extrinsic motivation as well. 'You must sit next to some students if you want them to study',

stated one teacher. He added that some teachers neglect teaching morale and 'let anyone pass without insisting on learning results'. Another teacher concurred but described a systemic problem:

> There are not real sanctions for absence or anything. Students get one chance after another … This destroys students' self-initiative and responsibility. Teachers, in turn, must do much work in vain, only to enable further skipping.

Most teachers considered students' ability to learn heterogeneous. Attention deficit disorders are common but some incoming students lack even the basic learning skills and strategies; for instance, they are not used to having pens and notebooks at school, taking notes and studying for exams. Accordingly, many teachers doubted students' ability for self-directed learning. A few students can choose useful courses themselves, set achievable learning goals and adhere to them responsibly; many others cannot.

All teachers recognised that their job includes improving students' ability to learn but many opposed self-directed learning. A couple of participants indicated that reluctant teachers may have a negative pedagogical attitude. One teacher noted: 'Teachers think that students just come to the workshop and work. Not at all! We must plan their assignments carefully'. Another added: 'We must talk a lot with students, consider their views and recommend courses for them'. The same teacher also called for a sense of proportion: 'Teachers may use their own reasoning. We have implemented individualisation to a reasonable extent. For example, we still create schedules for our students'.

Most teachers were concerned about incoming students' *mathematical competency* and the quality of primary-school teaching. Many students struggle with three-dimensional thinking and basic arithmetic and algebraic calculations. Some teachers added that they teach mathematical competency. One teacher had developed some basic pencil-and-paper-style calculation exercises but commonly teachers integrated mathematics in everyday activities. For example, students measure and cut pipes, cables and other material. Several participants further addressed *language competency*, because they observed some students struggle to understand what they read. They can hardly read manuals from cover to cover and cannot use a table of contents. Teachers considered deficiencies in literacy and numeracy to not only hamper and slow studies but also jeopardise graduation, coping with daily work and access to further education. In turn, some teachers reported on their positive experiences on adolescents' *ICT competency*. Students competently use different devices and applications and seek information on the internet.

To sum up, all teachers reported that they expect their students to develop basic-level domain-specific competencies during the IVET studies. Teachers train domain-specific competencies but do not require perfection from novice graduates. Every teacher also widely addressed students' needs and challenges in

learning competency. Many students struggle with self-directed learning skills and lack even the basic learning strategies. Students similarly fall behind with their competencies in language competency and mathematics. Already incoming students face these challenges; therefore, teachers reproached primary school teaching for not demanding enough from the students. Many students also lack an initial motivation to learn and need a lot of extrinsic teacher support for their motivation. Similarly, many students lack a motivation to work. However, there were differences between the vocational trades: teachers of electrical and automation engineering commonly appreciated students' motivation while teachers of metalwork and machinery did the opposite. A couple of teachers highlighted that teachers differ in terms of their pedagogical attitude, which may partly affect their utterances.

RQ2: Teachers' preferred teaching contents and methods

Results on teachers' teaching contents and methods are specified in Table 2. All teachers highlighted that their ultimate *mission* as a teacher is to educate employable professionals with a sense of pride. Some teachers also valued the will for lifelong learning and highlighted studies as a part of a good life.

All teachers addressed *fostering*. Most teachers reported taking care of their students. They represent an example of a 'safe adult' and regularly discuss with students. Some teachers embraced this task, while others would rather focus on professional development. Further, most teachers highlighted empathy. They help students with heartaches and understand their immaturity and interests besides school, such as dating and hobbies. Teachers also encourage students giving them constructive feedback and arranging opportunities for them to experience success in learning. Several teachers added that by showing their own enthusiasm to teach they try to engage students in learning. However, one teacher criticised that saying, 'Teachers should believe more in pedagogy and its effect on learning. Many teachers talk negatively about students, complaining that they are what they are and won't develop'. Last, most teachers try to create a safe atmosphere through discipline, common rules and equality. Thus, teachers may acquire students' trust and enable learning.

Most teachers addressed *professional development*. Several teachers said they instruct domain-specific competencies through their own professional example. Teachers also talk about their trades in a respectful way. Teachers coach students to workplace reality by relating incidents from their own job experience. Some teachers redirect the unmotivated students to other vocational trades if they cannot learn even with special-education interventions.

Table 2. Frequencies of categories related to teachers' instructional practices (RQ2).

Instructional practices	%	f/N
Mission	**15**	**42/12**
Professionalism	12	33/12
Lifelong learning	1	4/2
Good life	2	5/5
Fostering	**35**	**100/12**
Care	6	17/9
Empathy	7	21/9
Encouragement	6	17/10
Enthusiasm to teach	6	17/6
Safe atmosphere	10	28/10
Professional development	**13**	**36/9**
Own example	5	15/7
Relating incidents	3	9/7
Redirecting the unmotivated	4	12/4
Scaffolding	**22**	**62/12**
Gradually increased difficulty	9	25/12
Differentiation	7	19/8
Visualisation	4	12/3
Reflection	2	6/4
Deliberate practice	**15**	**44/12**
TOTAL	**100.00**	**284**

Note. f = frequency of analysis units.
N = number of participants raising the issue (max. 12).

All teachers reported that they plan and conduct lessons using different principles of *scaffolding* (cf. Wood et al., 1976). They model assembly techniques, supervise students, adhere to safety issues and gradually increase difficulty. Ultimately, advanced students are given independent tasks. Teachers also differentiate assignments and teaching methods. They visualise abstract and technical phenomena, for example, using a voltmeter. Some teachers conduct group reflection events to deepen students' learning.

Last, all participants instruct on professional proficiency through *deliberate practice*. Students gradually learn doing various exercises in the workshop. Teachers also debated whether the modern ICT-based teaching methods contribute to the learning of manual skills. However, one teacher noted that 'embracing new ways of teaching depends greatly on teachers' own attitudes'.

In sum, all teachers aimed to train their students into employable professionals. A few teachers also pointed out vocational studies as a means to aspire for

lifelong learning or a good life. As regards teachers' instructional practices, all teachers described about various forms of fostering. They show care and empathy to their students, encourage them with positive feedback and own enthusiasm and try to create a safe atmosphere where everyone respects common rules and equality. However, teachers' adherence to pedagogy or belief in students' potential may vary. Most teachers also addressed students' professional development. Teachers reported to teach through their own professional example and by grounding their viewpoints to past incidents in their professional careers. Teachers commonly instruct their students in a workshop where their students learn to do professional assignments through deliberate practice. Adhering to the principles of scaffolding, teachers gradually increase assignment difficulty and reduce guidance for students.

RQ3: How workplace learning may affect students' learning

In Table 3 we present the results of the third research question and its sub-questions. Subsequently, we introduce the results in more detail following the order of sub-questions.

Competencies developed during workplace learning

All participants considered workplace learning (WPL) positive for students' development in *domain-specific competencies*. During WPL, students learn self-regulative knowledge to sequence tasks and comprehend work processes. Students also learn procedural knowledge to use tools and assembly skills. However, teachers emphasised school as 'a better place to learn theory' and other declarative knowledge.

Some teachers considered that students mature during WPL. Working with adults helps them to develop positive *professional self-perception*. Teachers also highlighted *work-related attitudes*. Students learn responsibility through workplace rules and experience 'what is it like to be at work'. Some teachers debated conscientious attendance. Positively, when students continue studies at school after WPL they adhere better to timetables. Some participants further addressed *social competency*. At the workplace, adolescents improve their ability to communicate with other people and collaborate in teams. One teacher added that gaining membership in a work community is 'quite a job for the youth' but an important task.

A few participants stressed WPL as an effective way to acquire *motivation to work*. One teacher stated that some students like even monotonous tasks because they may work independently. However, some students expect more: 'Sometimes students prefer to change the workplace, which is good. During their studies, they may try different jobs and employers and find a position they enjoy'. Last, some participants addressed *learning competency* and mentioned that WPL develops motivation to learn. School-weary students may get a clean start. As

put by one metalwork teacher: 'Here at school we almost felt that nothing helps but after the apprenticeship the employer praised the student to the skies!' High achievers, in turn, do not become frustrated because they may proceed quickly.

Table 3. Frequencies of categories related to teachers' perceptions on workplace learning (RQ3).

	%	f/N
RQ3.1 Competencies		
Domain-specific competencies	**67**	**59/12**
Professional self-perception	**5**	**4/3**
Work-related attitudes	**8**	**7/5**
Responsibility	2	2/2
Conscientious attendance	6	5/4
Social competency	**8**	**7/4**
Communication	3	3/2
Collaboration	5	4/3
Motivation to work	**6**	**5/4**
Learning competency	**7**	**6/3**
Motivation to learn	7	6/3
TOTAL	**100**	**88**
RQ3.2 Conditions		
Applicant screening	**14**	**28/12**
Workplace heterogeneity	**24**	**49/10**
Coaching	**12**	**24/9**
Matching	**23**	**48/10**
Networking with employers	8	17/8
Planning of apprenticeships	4	9/4
Promoting students	11	22/7
Assessment	**11**	**23/7**
Teacher development	**16**	**33/9**
TOTAL	**100**	**205**

Note. f = frequency of analysis units.
N = number of participants raising the issue (max. 12).

Conditions and teacher contributions for successful workplace learning

According to all participants, the best part of workplace learning (WPL) is *applicant screening*. Employers assess potential employees and students have a chance to show their skills. Many graduates are hired by their former apprenticeship organisations. However, not all the results of WPL are positive; some teachers also criticised *workplace heterogeneity*. Every firm cannot offer versatile tasks because they operate on a specialised niche or lack equipment. Moreover, employers' commitment varies. Some teach any apprentice but some only teach potential

employees. Many employers cannot provide enough guidance either because they lack personnel suitable for mentoring or have too much work already. Consequently, employers assign only simple, repetitive tasks, or take apprentices to ease their own burden. Teachers deemed that schools, on the other hand, offer versatile learning environments for everyone.

Teachers continued reporting how they contribute to students' WPL. Teachers reported that they *coach* students for apprenticeships. They develop students' competencies and select those ready for WPL. Teachers *match* potential students and employers. Matching involves networking with employers during supervision of students' apprenticeships and mutual planning of apprenticeships. Teachers promote students to those employers who offer decent working conditions, quality mentoring and opportunities for future employment. Teachers also know which workplaces are to be avoided because they do not offer decent working conditions.

Many teachers reported that WPL encompasses various *assessment* tasks. Teachers visit workplaces and supervise apprentices. Afterwards, teachers hold summative debriefing sessions with the employer and the apprentice. Most teachers emphasised that supervision creates potential for *teacher development*. While teachers receive feedback about apprentices and their learning, they may fine-tune their own teaching. Teachers also learn about new equipment and sometimes receive invitations to employers' in-house trainings; car mechanics can often take advantage of such training. Teachers may also carry out a WPL period themselves.

To summarise, all participants considered WPL relatively positive for student learning of competencies. During their WPL periods, students may advance their domain-specific competencies and develop a more positive professional self-perception. Students mature in many other ways as well. Workplace rules and conventions enhance students' work-related attitudes, for example responsibility and conscientious attendance. Interaction with senior professional workmates helps students to further their communication and collaboration competencies. Learning by doing real-life job assignments, students may acquire a stronger motivation to work and learn. At its best, a successful WPL period may yield a job offer for the student. However, according to the teachers workplaces are very heterogeneous in terms of their possibilities to offer high-quality WPL conditions. Therefore, teachers need to know to which firms they may send their students for WPL periods. In addition, a successful WPL period requires that teachers coach their students to the workplace realities and plan apprenticeships together with the workplace supervisors.

Discussion and conclusions

Methodological reflections

To ensure its credibility, this qualitative interview study was carefully conducted in an accountable and visible manner (Anfara et al., 2002). Research questions were based on existing research needs, as articulated in the preceding literature. The research participants represented experienced vocational teachers; thus, the richest possible data could be collected (Brinkmann & Kvale, 2018; Elo & Kyngäs, 2008). Being ordinary vocational teachers in an ordinary vocational school, the research participants' arguments may also represent general teacher views to some extent (cf. Brinkmann & Kvale, 2018). Semi-structured interviews allowed to collect detailed data on participants' viewpoints and to develop a deeper understanding of the studied phenomenon; thus, the chosen data collection method was justified in terms of the study aim (Brinkmann & Kvale, 2018). The conducted twelve interviews also yielded saturated data (Brinkmann & Kvale, 2018). Ethical principles of researchers' university were considered through the research process; the anonymity and voluntariness of participants and unequivocal display of research results was ensured.

However, some features of the study limit the conclusions that can be drawn from the results. A disadvantage of the interview as a data collection method is that interviewee answers may be ambiguous, contradictory or seemingly irrelevant to the interview topics; thus, the interviewing researcher tried to pay as much attention as possible to these discontinuities, focused on what the interviewee explicitly said, what was 'said between the lines', and whenever necessary, posed clarifying questions (cf. Brinkmann & Kvale, 2018). Still, some discontinuities might have still remained and affected the analysis. Further, the interviewed teachers represent only one ordinary Finnish vocational education provider and four different vocational programmes. Teachers' views were scrutinised in-depth to acquire a deep understanding (Brinkmann & Kvale, 2018) but these may only partially represent opinions of technical-trade teachers in other schools. Teachers from other vocational trades might have also given different viewpoints. Consequently, generalisations to other schools and vocational fields should be made critically.

Results in light of previous research

Teachers' perceptions on competencies
Our findings clearly imply that teachers consider domain-specific competencies as the core of vocational education. Graduates should understand basic knowledge on work-safety issues, materials and tools broadly enough to become employable. This result is consonant with earlier studies (e.g., Berner, 2010; Köpsén, 2014) but also with our previous findings on employer views on graduate

competencies (Löfgren et al., 2020). Teachers' standpoint also reflects a more general, workplace-driven, occupationalistic standpoint to IVET student competency needs which seems to be the main paradigm in the Finnish IVET (Mulder, 2014; Isopahkala-Bouret, 2010; Rintala et al., 2018). Teachers further revealed that graduates achieve domain-specific competencies heterogeneously due to lack of job experience. Employers share this view and do not expect perfection of graduates (Löfgren et al., 2020).

In comparison to employer views (see Löfgren et al., 2020), the greatest difference in competency expectations seems to be that teachers favoured more mathematical and language competencies to enable further education. The teachers reported that some students struggle even with basic mathematics, have problems understanding what they read and severely question the need to cultivate their competencies in mother tongue and mathematics. Students may still succeed at manual work; thus, employers might not have highlighted these deficiencies (Löfgren et al., 2020). At the same time, the industry may adhere only to their immediate competency needs (Mulder, 2014). There is also a more gene-ral tradition of undervaluation of general disciplines within technical vocational trainings (cf. Bakker & Akkerman, 2019; Niemi & Rosvall, 2013). Consequently, in line with Mulder (2014), we suggest that all vocational teachers should embrace their pivotal role as protagonists of general disciplines because these will further students' prospects in their lives in general.

In addition, teachers in this study expressed a deeper apprehension about the status and future of IVET. Teachers especially debated adolescents' learning competency and incoming students' common lack of motivation to learn. Most teachers further stated that the youth struggle with their ability to learn and especially with self-directed learning: students can hardly set attainable learning aims and steer their learning (see also De Bruijn & Leeman, 2011). Consonant with Vähäsantanen and Hämäläinen (2018), teachers in our study expressed that they must attempt to fill gaps in students' primary school education, in such areas as basic mathematics, good manners, timetables and responsibility. In our previous study, technical-trade employers recognised similar IVET apprentice shortcomings (Löfgren et al., 2020).

However, some teachers stated that student self-direction might evolve if teachers themselves developed their own attitudes and instruction. Teachers' attitudes might stem from a dominant craftsperson habitus (Berner, 2010) or insufficient teacher studies (Köpsén, 2014; Nylund & Gudmundson, 2017). Moreover, the results revealed a systemic problem: indifferent students do not risk disqualification. In fact, Rintala et al. (2018) found that the modern graduation-rate-based model of state funding may induce education providers to let students graduate without having passed all the tests. Consequently, we argue that some

technical-trade teachers' reluctance towards pedagogy may have both individual- and system-level characteristics. Future research should examine these patterns in-depth to find out ways to develop vocational teaching.

Teachers' instructional practices

Consonant with earlier research (Berner, 2010; Isopahkala-Bouret, 2010; Vähäsantanen & Hämäläinen, 2018), all participants highlighted professional proficiency as the key aim of teaching. A few mentioned lifelong learning or living a good life, which implies that the teachers seem to have adopted a relatively occupationalistic view to competencies (cf. Mulder, 2014). However, all teachers described their everyday teaching practices as quite the opposite: they foster more than teach professional competencies. All participants had a relatively uniform palette of teaching practices. They teach within deliberate practice, model trade-specific job tasks, support and supervise. As students learn, they gradually gain independence. This type of scaffolding is a tradition in technical-trade teaching (Berner, 2010). Most teachers further stated they differentiate their teaching and assignments but only a few mentioned other teaching methods, such as visualisation and reflection.

Again, some participants expressed that teachers themselves commonly stick to their 'old habits' and question the need for pedagogical competency (e.g., on self-directed learning) due to a negative attitude or lack of training. Earlier research confirms these teacher remarks (Berner, 2010; Nylund & Gudmundson, 2017). Berner (2010) states that a dominant craftsperson habitus incorporates a tenacious tradition of preferable training methods. In line with earlier research, we suggest that teachers would profit from up-to-date pedagogical competency in terms of decreased stress, better learning results and well-being at work (Köpsén, 2014, Nylund & Gudmundson, 2017). However, earlier Finnish studies (Rintala et al., 2018; Vähäsantanen & Hämäläinen, 2018) also highlight such teacher concerns as understaffing, excessive workload, lack of time and high pace of changes that may cause inertia. We suggest further research to discover causes behind vocational teacher inertia.

The effects of workplace learning on student learning

All teachers considered workplace learning beneficial for students' professional development. Students mature during their apprenticeships developing professional self-perception and work-related attitudes. Thus, as put by Bakker and Akkerman (2019), students cross the boundaries between school and workplace and transform from adolescents into young adults and novice professionals. Still, most teachers highlighted applicant screening as the greatest benefit of WPL. Employers may screen potential employees and students may become employed. This is in line with employer views (Löfgren et al., 2020). Moreover, teachers un-

derlined that workplaces provide very heterogeneous conditions and assignments for students (see Isopahkala-Bouret, 2010, and Pylväs et al., 2018, for similar results). Our results enrich the existing theoretical discussion by highlighting some causes for this heterogeneity. First, employers may have specialised themselves heavily. Second, they may lack commitment for student development and use apprentices only as a source of cheap labour (cf. Isopahkala-Bouret, 2010; Mårtensson et al., 2019). Third, they may not provide enough guidance due to their hectic work pace.

Further, our results highlight teachers as gatekeepers on a boundary from school to work. In line with earlier research (e.g., Berner, 2010; Köpsén, 2014; Mårtensson et al., 2019), we found that teachers train students for apprenticeships by developing their domain-specific competencies and coaching them about working life requirements. Teachers use their stakeholder networks, match students with potential employers; thus, they arrange for them opportunities to enter the world of work.

At the same time, our results uniquely emphasise teachers as students' 'attorneys'. Teachers safeguard students from unethical employers and actively recruit upright apprenticeship providers who offer students proper learning opportunities. Interestingly, these findings seem to indicate teachers' mistrust towards some employers. Similarly, Vähäsantanen et al. (2009) found that some employers question vocational teachers' domain-specific expertise.

We believe that the development of trust is interwoven in the practices of boundary crossing. When teachers and employers organise and coordinate students' WPL periods and teachers attend employers' in-house trainings, they may identify each other's strengths and roles; thus, they may also learn to appreciate each other's competence (Bakker & Akkerman, 2019). Therefore, we suggest that the boundary zone between school and work should not be considered only as an area of (student) development and transition (cf. Berner, 2010; Köpsén, 2014; Mårtensson et al., 2019), but also as a collaborative environment to create trust. Thus, students may experience high-quality workplace learning, employers may acquire competent future employees and teachers may consolidate their position as gatekeepers to work. Now that workplace learning plays a greater role in modern European vocational education (Jossberger et al., 2010; Rintala et al., 2018), it is paramount to further study how boundary processes contribute not only to students' development but also to that of teachers and employer organisations.

Practical implications and conclusions

This study has scrutinised a scarcely studied teacher-level viewpoint on IVET graduate competency needs and instructional preferences. First, the results strongly emphasised that most teachers share a uniform view with stakeholder employers (Löfgren et al., 2020) on graduate competency needs. Graduating students need to understand elementary domain-specific competencies to be able to

start in professional work. At the same time, graduates cannot have broad job experience; therefore, they distinguish themselves with domain-general competencies in recruitment. Teachers also recognise students' strengths and weaknesses relatively unanimously with employers. Students are very heterogeneous. Many suffer from learning and motivational disabilities and lack of work-related attitudes and social competency. Students' challenges may initially stem from deficient primary school teaching and this calls for further research.

Secondly, our results implied that the studied technical vocational teachers considered themselves primarily as craftspersons and mediators of domain-specific competencies. Most of them also adhered to a fairly traditional 'master-apprentice' way of teaching through deliberate practice. At the same time, most teachers recognised the need for student fostering (in domain-general competencies) but were more or less reluctant to embrace this task. In fact, some technical-trade vocational teachers may not intervene in students' challenges because they lack pedagogical knowledge on such topics as self-directed learning and reflection. Up-to-date pedagogical knowledge could help teachers tackle students' challenges and relieve their own stress. Furthermore, modern employers expect workers to engage in self-directed work and have self-initiative; thus, teachers must be able to address these qualities and skills in their instruction. Hence, we recommend supplementary pedagogical training for teachers and suggest further research on how vocational teachers may guide students' self-directed learning.

Last, our results indicated that teachers consider workplace learning mostly positive for student learning of competencies. At the workplace, students mature and may develop a deeper understanding, for example, about state-of-the-art tools, assembly techniques and materials. School-weary students get a second chance to show their skills and high-achievers get sufficiently demanding challenges. Every student may also get 'a foot in the door' and aspire for future employment. However, our results uniquely highlighted vocational teachers as 'attorneys' who protect students' rights for equal learning opportunities, especially in apprenticeships. If workplace learning is excessively emphasised and teaching at school is cut to the minimum, we believe there is a risk that apprenticeships and personal connections become the sole recruiting factors for graduates. Thus, the status of vocational education and the diploma will deteriorate. This would hardly affect motivated students but could make labour market entry even more difficult for the weak and initially unmotivated students. To safeguard equal learning for everyone, we argue that skilful teachers are still needed.

Declaration of interest statement

No potential conflict of interest was reported by the authors.

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