

Vocational Didactics: Mapping the Terrain in Swedish Upper Secondary Vocational Education and Training

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Abstract

Purpose: The article focuses on the contribution of didactics and didactic theory as a distinct strand in research on vocational education and training (VET). Empirical research is reviewed to further explore what characterizes vocational didactics in the Swedish context of Upper Secondary VET.

Approach: Semi-structured and flexible review methodology was used to identify didactic research and map its emergent features. An analytic framework was constructed for this purpose and used iteratively throughout the review process. The framework expresses the constitutive simultaneous interdependence of the relationships A-B-C. They refer to A) the ways of how the actors engage with the content as meaning and matter or relationship between the actors and the content, B) the relationship between the actors and the method through interaction with the content, and C) relationship between the methods embedded in work tasks and school assignments and how they underpin the content. A total of 26 sources was identified and thematized as school-based vocational didactics, collaborative vocational didactics, and work-based vocational didactics.

Findings: Four distinct features of vocational didactics in Upper Secondary Vocational Education and Training (USVET) are outlined: 1) Diversification of the use of simulation as a

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method in school-based education pointing to vocational knowledge and skills 2) broadening of instruction (and reflection) as a method by inclusion of several parties (e.g., supervisors, workplace staff, instructors-practitioners), 3) work tasks as a method pointing to vocational knowledge and skills as content, 4) interaction between several parties using verbal and non-verbal means. Despite a growing interest in the importance of work tasks in their dual affordance of meaning and matter, few sources deal with students' learning processes in alignment with the logic of the production of goods and services.

Conclusion: The analytic framework we have put forth strengthens the conceptual boundaries of vocational didactics from a point of view of profession-related learning objectives (content), actors, and methods involved. Applying the didactic theories to review empirical research on VET strengthens the integrity of vocational didactics as a particular field.

Keywords: Vocational Didactics, Didaktik, Upper Secondary Vocational Education and Training, Vocational Knowledge and Skills, Vocational Education and Training, VET

1 Introduction

The article focuses on the contribution of didactics and didactic theory as a distinct strand in research on vocational education and training (VET). At least two research orientations can be identified in the ongoing discussion on vocational didactics. One orientation focuses on clarifying the multiple meanings of vocational didactics in relation to general didactics, (vocational) subject didactics, curriculum concepts focusing on teaching and learning in VET, and vocational pedagogy (Gessler & Herrera, 2015; Lucas et al., 2012; Moreno Herrera, 2015; Pahl, 2014). The second research orientation emphasizes the term vocational didactics as an analytical tool to develop knowledge about the ongoing teaching and learning processes in various VET settings (Meltzer & Schwencke, 2020; Nore, 2015; Wyszynska Johansson, 2020a). Here, the didactic framework is supplemented with other theoretical starting points connected to the research questions, making didactic theory somewhat less prominent. For instance, Meltzer and Schwencke (2020) start in a conceptualization of art-based learning to examine didactics in artistic work. Wyszynska Johansson (2020a) combines didactic theory with Legitimation Code Theory to examine teaching and learning processes in an upper secondary diploma project for security officers and pre-school teacher assistants in Sweden. Despite the consensus among researchers that there is no clear definition of vocational didactics, the concept's explanatory value is emphasized as a counterweight to curriculum-driven and assessment-driven vocational education that focuses on learning outcomes rather than the didactic choices made about teaching and learning in VET (Marhuenda-Fluixá & Ros-Garrido, 2015). As argued by Pahl (2014) and Moreno Herrera (2015) different didactic approaches emerge as significant to examine and enable the development of vocational

knowledge and skills in various professional areas. The multiple approaches to teaching and learning in VET motivate a literature review to further explore emerging features of vocational didactics in different contexts i.e., the Swedish context of USVET.

The aim of the review is to explore the boundaries of vocational didactics grounded in theory applied to empirical research on Upper Secondary Vocational Education and Training (USVET) in Sweden. To achieve this, empirical qualitative research on USVET is reviewed to identify patterns to be explored and thematized. The research questions addressed are: 1) How can vocational didactics be differentiated as a strand in research? 2) What are the emergent features of vocational didactics in USVET?

In Sweden, vocational education and training for young people (16-19 years) is part of the cohesive upper secondary school system. There are 12 national VET programs with up to six vocational orientations each, aimed at different work areas. Eligibility for higher education can be obtained in all programs. In this three-year education there are two pathways, one that includes a minimum of 15-week work-based learning, and one predominantly based in one or several workplaces called the upper secondary apprenticeship education. The two pathways share the same base of general subjects i.e., mathematics, natural science, social science, history, religion, Swedish, English, Physical Education, and vocational subjects. The schools are responsible for organizing USVET in consultation with the local labour market, in collaboration with workplaces and in relation to the students' choices.

The article proceeds by briefly introducing research on vocational didactics in Sweden and elsewhere. Then vocational didactics as a theory is introduced followed by the analytic framework put forth and the review method. The findings are thematically summarized. On the basis of patterns identified, distinct features of vocational didactics in USVET are discussed in relation to vocational didactics as a research strand in VET.

2 Traces of Vocational Didactics in VET Research

Research that directly or indirectly examines vocational teachers', trainers', instructors', and students' engagement in vocational education serves to illustrate various aspects and challenges of vocational didactics. In a research review Bouw et al. (2019) examine how vocational education and training is operationalized in schools or training centers and workplaces, with a special interest in boundary crossing. In another research review Mikkonen et al. (2017) focus on guidance in workplaces. These reviews indicate that the central aspects of vocational didactics are embedded in school-based and work-based educational settings. In this context, school-based teaching and learning concern the interaction between vocational teacher and students in curriculum guided and work-related school assignments (Brennan Kemmis & Green, 2013; Berglund, 2009; Berner, 2010; Bijlsma et al., 2016; de Bruijn & Leeman, 2011; Lindberg, 2003; Placklé et al., 2014). Work-based teaching and learning emphasize students'

engagement in the process of production and reflection over daily work assignments together with a supervisor and staff (Filliettaz et al., 2015; Nielsen et al., 2021).

The interrelated teaching and learning environments in VET, school/training center and workplace also present challenges that require new approaches to teaching and learning. One challenge is the problem of knowledge transfer across sites (Aarkrog, 2011), another is the question of how to bridge the gap between what students are given opportunities to learn during their education and the knowledge needed in working life (Gessler & Howe, 2015). These challenges have contributed to the emergence of new VET practices intended to support students' learning across sites (Aarkrog, 2011; Sappa et al., 2016). One example is school based digital tools that support students learning in workplaces (Nore & Lahn, 2014), another is the creation of a shared space for communication about learning objectives of mutual interest (Andersson, 2018; Nielsen et al., 2021; Virtanen, 2014). What these potentially new ways of organizing vocational education mean in relation to vocational didactics may be further explored in relation to specific VET models, and the national research fields.

A steady growth of studies on didactic approaches in USVET reveals a growing interest in this emerging field of research in Swedish VET. The output of two national research schools in vocational didactics (2011) and vocational subject didactics (2012) contribute to a possible consolidation of the emerging research field that focuses on teaching and learning in the multiple settings of USVET. The scientific output can be thematically summarized as research on i) teaching and learning vocational knowledge and skills, ii) assessment, iii) supervision in relation to work-based learning and iv) identity formation (for an overview see Fejes et al., 2017a). There is also a growing field of research in sociology of education that adopts a critical perspective on the production, reproduction, and legitimation of knowledge through teaching. This line of research illuminates teaching and learning from the point of view of social categories (gender, class, identity) and how they are played out in USVET (inter alia Ferm et al., 2018; Ledman et al., 2021; Rönnlund et al., 2019; Rosvall & Nylund, 2022). Critical studies inform and enrich research in VET by pinpointing important issues that need to be catered for in USVET. However, from the perspective of vocational didactics they put teaching and learning for the development of vocational knowledge and skills in the background creating a gap that this review aims to attend to.

3 Grounding Vocational Didactics Theoretically

Didactics is a core concept in educational theory and practice. Didactics explores learning and teaching processes for knowledge development in various domains of human activity (Krogh & Qvortrup, 2021). Didactics emphasizes the autonomy and integrity of teaching, clearly separated from learning and studying. Didactics can be traced in any kind of teaching and learning context with the aim to develop knowledge (Comenius, 1657/1907). In VET,

stressing the dimension of teaching offers useful conceptual tools to explore how young students develop vocational knowledge and skills (see also Pahl, 2014). Therefore, didactics can serve as a foundation for organizing vocational education and training (VET) in and across various settings, e.g., school and work. In dual VET models, e.g., Germany and Denmark, vocational didactics mainly focuses on guidance for learning in and through work whereas school-based learning serves as a complement (Aarkrog, 2011; Gessler, 2017). In school-based VET models, e.g., Sweden and Finland, learning in school is combined with shorter or longer periods of work-based learning, sometimes emphasizing a didactic approach that supports integration of learning across school and workplace (Andersson, 2018; Virtanen et al., 2014). Despite the variety of models for teaching and learning that the actors put into play, there is no guarantee for specific learning outcomes to be achieved (Lucas et al., 2012). To expand and elaborate vocational didactics theoretically we turn to ideas or principles that strengthen the role of meaning-making in teaching and learning processes in VET, i.e., vocational knowledge as content and the principle of pointing.

Vocational Knowledge as Content

The nature of vocational didactics can be summarized as planning, execution, evaluation, and critical analysis of occupation specific activities and learning objectives. Here, the emergent, open-ended, and contingent nature of teaching and learning is emphasized and the content can be theorized (Deng, 2015). Vocational knowledge and skills are multidimensional as they include various ways of knowing in action. These dimensions can be captured in Aristotelian terms of techniques and procedures (*techne*), context independent codified knowledge and context sensitive situated judgement (cf. Billett, 2011). Knowing in action is set in motion in teaching and learning processes that need to be made sense of by the actors involved. In this context, didactics offers ways to distinguish the manifest and substantial, though sometimes less prominent, content that is essential in teaching-learning processes (cf. Hopmann, 2007; Klafki, 1995). In VET manifest content can be explained as a mundane task of polishing a metal piece (matter) and serves as a vehicle for knowledge to be unpacked and elaborated on. Substantial knowledge is multidimensional, as mentioned above, and includes the complex nature of mastering materia in purposeful and meaningful ways (meaning). The analytic distinction between knowledge as matter (the finished process and product) and knowledge as meaning (*techne*) can be a heuristic tool for studies in the field of vocational didactics. Teaching as part of a totality can also be extended to include other relevant actors and situations in both schools and workplaces that engage in VET. This emphasizes teaching, including didactic choices that focus on work tasks and various ways to support students' development of specific vocational knowledge and skills (Hiim & Hippe, 2001; Lindberg, 2003).

The Principle of Pointing

The didactic distinction between what is learnt and what is taught enables conceptualization beyond the simplistic explanations of one-way transmission. Biesta drawing on the German scholar, Klaus Prange emphasizes the act of pointing something to someone as a basic operation in teaching (Biesta, 2022). Pointing is a reciprocal activity of directing and steering attention to vocational content by actors. The principle of pointing thus involves both social and epistemic relations as it invites and stages interaction between the more knowledgeable and the less knowledgeable part. In VET, workplace supervisors, staff, students, and vocational teachers may all engage in pointing. Here, activities of pointing open a common space for interaction, and reasoning in search for explanations and justifications of a course of action. By focusing on the principle of pointing, vocational content is set in motion.

4 Vocational Didactic Framework for Analysis

For the review we propose a didactic framework to identify and analyze empirical research on USVET, inspired by earlier triangular models. The basic premise for didactics in VET consists in the interplay between the three elements, content, method, and actors involved in teaching and learning (Hopmann, 2007; Hudson & Meyer, 2011; Künzli, 2000). The proposed framework builds on the following assumptions: the contingent nature of learning, differentiation of content into matter and meaning and, integrity of teaching and learning. In our analytic framework, we build on the basic interplay between the three elements and emphasize the simultaneous interdependence of the three relationships, A-B-C. They refer to A) the ways of how the actors engage with the content as meaning and matter or relationship between the actors and the content, B) the relationship between the actors and the method through interaction with the content, and C) relationship between the methods embedded in work tasks and school assignments and how they underpin the content (see Figure 1). As the two-way pointing arrows in figure 1 show the three relationships cannot be untangled from one another.

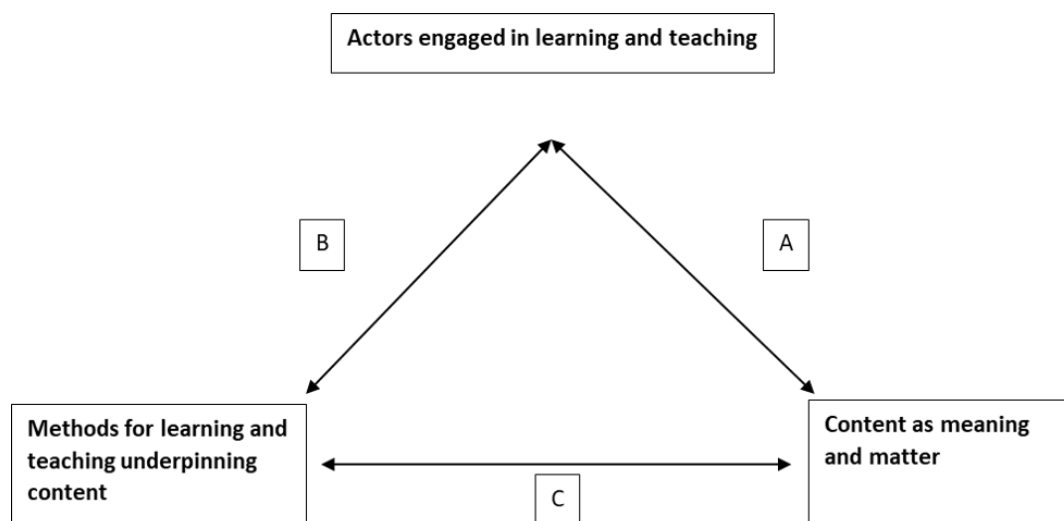


Figure 1: Analytic Framework of Vocational Didactics

Based on the analytic framework the following questions guide the review: What content is manifest and how is it motivated as legitimate? What methods for the development of vocational knowledge and skills are mentioned and what is their rationale? Who are the actors involved and what is their mutual interdependence?

5 Method

Semi-structured and flexible review methodology was used to identify didactic research in order to map its emergent features (Jesson, 2011). In line with our two-fold aim, the review method allows us to explore and thematize patterns, i.e., similarities and common interests across qualitative studies (Grant & Booth, 2009). The analytic framework above was used exploratively and iteratively as it informed and guided the selection process of research included in this review and how the patterns were interpreted and eventually synthesized.

The sample of Swedish studies was compiled using the following criteria: Qualitative method reported in peer-reviewed articles in Swedish and English and dissertations (monograph thesis) published between 2012 and 2022. The short time span is motivated by an upsurge in research on USVET in Sweden because of the two research schools (Fejes et al., 2017a). Searches were performed in EbscoHost ERIC database restricted to abstracts in peer reviewed academic journals.

Complementary searches were performed in SwePub for dissertations and in the database of Nordic Journal of Vocational Education and Training. To capture two dimensions of relevance to vocational didactics, a narrower sense of occupation as readiness for work and a broader sense of occupation as vocation (Billett, 2011), the following search terms were used: vocational learning OR vocational teaching AND learning occupations AND vocational education and training NOT continuing education NOT higher education¹. A total of 48 hits referred geographically to Sweden. Studies on teacher students and/or vocational teachers' continuous professional learning, historical phenomena, in philosophy of education generating theoretical framework, and curriculum policy were excluded. By excluding studies that examine the teaching of general school subjects in USVET, we admit that studies of school subject integration involving vocational content fell out of the scope.

The first reading of abstracts (including key words) eliminated studies in contexts other than Swedish USVET. Several topical interests were identified. They included assessment, vocational teachers' work, developing vocational knowing and identity, digital aids, workplace-based learning, organization of vocational education and training. However, these manifest topical interests cannot on their own place a particular piece of research in the field of vocational didactics. In this part of the selection process the proposed analytic framework constituted a further inclusion criterion. 26 sources that showed a strong presence of vocational didactics (interdependence of the three relationships) were chosen for analysis in this review (Table 1).

Table 1: Number of Sources in Educational Settings

Educational setting	Number of sources
Industry/Industrial Technology programme	8
Crafts/Handicraft programme	6
Nursing/Health and Care programme	5
Security/Child and Recreation programme	3
Building and construction programme	1
Sales and retail/Business and Administration programme	3
Agriculture/Natural Resource Use programme	1
Restaurant/Restaurant Management and Food programme	1
Electricity and Energy programme	1

Note. The total number of sources (26) does not correspond to the number of USVET areas as one source may refer to several areas.

¹ A search resulted in 1237 hits (22-11-06). Despite the exclusion criterium the search returned sources dealing with higher and continuous education.

The analysis was performed in the following steps:

1. Close reading of the 26 publications guided by the analytical questions: What content is manifest and how is it motivated as legitimate? What methods for the development of vocational knowledge and skills are mentioned and what is their rationale? Who are the actors involved and what is their mutual interdependence?
2. Similarities and differences of vocational didactics in the different USVET areas were discussed and preliminary themes were identified.
3. Features of vocational didactics were chiseled out and synthesized.

6 Findings

The themes that capture patterns in the empirical research are presented as follows: School-based vocational didactics; Collaborative vocational didactics; Work-based vocational didactics. Within each theme, the emerging features of vocational didactics are synthesized.

6.1 School-Based Vocational Didactics

This strand of research explores various simulations of occupational practices in the extended classroom (e.g., school workshop). By simulating bad and good conduct with customers, role play directs the students' attention to central knowledge in the beauty industry (von Schantz et al., 2013). The practice is transformed to better fit the classroom confinements, e.g., by transforming specific security officers' work tasks (meaning and matter) into quite generic social practices of school group work (method) (Wyszynska Johansson, 2020a; Wyszynska Johansson et al., 2019). These simulations include methods where vocational teachers tell and share stories. Biographical success-stories illustrate in creative ways how the development of occupation specific skills contributes to vocational identity formation based on certain virtues e.g., learning patience (Tyson, 2016). By sharing stories about the origins of occupations and built-in traditions, the teachers aim to assist the students' development of a vocational identity (Lundgren & von Schantz Lundgren, 2012). Current and former students serve as repositories of meaning and matter when they share stories of good and bad practice, coming from patients and staff in workplaces (Eliasson, 2019). In teaching based on integration of contents through thematic units, teachers use storytelling to contextualize general knowledge of ethics to better suit the needs of prospective nursing assistants (Christidis & Lindberg, 2019).

In a school hairdressing salon, the teacher monitors moment by moment the student's bodily interaction with the material, making occupational standards (meaning and matter) e.g., for the colouring process salient. Here, feedback on work processes, as method, emerges from the student's concerns that the teacher responds to moment-by-moment, giving the floor to the students by shifting bodily positions and allowing for silence (Kilbrink & Asplund, 2020b; Öhman & Tanner, 2017). Dealing with creative content as meaning and matter e.g., coiffure is organized as problem-solving (method) with the teacher directing the student to position herself to get the relevant angle of vision necessary for manipulation of the material with the tools (Öhman, 2018).

Gåfväls (2016) detects three dimensions of the content as meaning and matter displayed through student-teacher interaction with botanical material, that is, aesthetic standards, financial awareness, and the use of the customer's perspective (method) in shifting contexts (funeral arrangements). These findings discriminate a specialized way of seeing and therefore conflate vocational knowledge and identity that the students develop simultaneously.

Gustavsson et al. (2020) show how driving simulator-supported teaching as a method in the natural resource use program presents new opportunities e.g., for safe and economically viable practice as well as challenges regarding e.g., fidelity. The implementation of digital technologies profoundly changes the teachers' choice of method and organization of content as meaning and matter (integration of contents) and the way of instructing students e.g., through self-assessment.

Quite a few studies explore simulations of industrial practice, e.g., welding through instruction in school workshop (Asplund et al., 2021, 2022). The methods for the instruction in the welding booth are guided by the principle of pointing, that is, various ways for the teacher to direct attention to the content of learning. Grabbing/nudging the arm of a student, brings to the fore the hierarchical relation between critical aspects with angle being a superior one. Step-by-step modelling highlights and separates critical aspects of the whole work process through which the student and the teacher establish a common resource of multi-modal experience (Kilbrink & Asplund, 2020a, 2020b). Pointing as a principle also involves the teacher demonstrating how not to weld to create contrast to proper actions of welding (method) (Asplund & Kilbrink, 2018). Even though the teacher maintains a tight grip on the welding skills as specific content (meaning and matter), the interaction between the students remains open and dynamic, enabling a joint elaboration of the critical aspects of welding (Kilbrink & Asplund, 2020a). Attending to and handling the tools and machines according to occupational standards not only constitutes the salient content as meaning and matter but also shapes relations between the teacher and students (Asplund et al., 2022). The teacher is positioned as the more knowledgeable person as s/he responds to emergent problems in work processes, staging mini-lectures and demonstrations when the need arises, rather than in advance.

Conceptualization, verbal analysis, and reflection are singled out as methods in the classroom. Gåfväls (2018) illustrates how expressions of aesthetic judgements are developed in floristry education. In nursing education, the teachers stage discussions to support the prospective nursing assistants' self-knowledge with the help of role play, fiction, and cases (Eliasson, 2019). Christidis (2019) shows how the teachers assemble and sequence content as a thematically integrated unit, using writing, reading, discussing, and drawing as they rely on printed and audiovisual material.

In sum, vocational didactics offers plenty of opportunities for simulations of occupational practice, but it also relies on the teacher's choice of method. Directing mutual attention to the content as meaning and matter with various verbal and material means, the teacher stages demonstrations of work process and product, manifesting the principle of pointing. The students appear as active participants in work processes guided by the teacher as those in the know.

6.2 Collaborative Vocational Didactics

This strand of research stresses the importance of collaboration as an organizing principle in vocational didactics. The interdependence of work and school in various forms of interplay are explored. The needs of local industries have an impact on the content and organization of education (Persson Thunqvist & Gustavsson, 2021). A culture of collective support (actors) is helpful in the induction of the young to different work tasks (method). In this case, the vocational teachers supervise the students in workplaces alongside the regular staff of various ranks and formally appointed supervisors. Access to advanced work tasks in e.g., a paper mill, including occasional problem-solving at costly stoppages appears as rich and recurrent opportunities for learning along with the acquisition of certificates in workplaces (see also, Wyszynska Johansson, 2020a, 2020b).

Fjellström (2014) shows how the school-based worksite is run by a site manager with the teachers who stay focused on the students' learning in the project-based component of a Building and construction program. This workplace-based element, relied heavily on smooth coordination and communication between several parties involved e.g., architects. Accordingly, failures in this regard introduce the students to the messiness of work processes, resulting in avoidance to make mistakes and passivity. Andersson and Lindberg (2022) show how students in collaboration with the teachers and supervisors contribute to the shaping of their education (see also, Kristmansson, 2016). The students ask for specific work tasks, and guidance to learn specific vocational skills e.g., in sales. Collaboration between the supervisors and the teachers facilitates transfer of basic knowledge and experiences between workplace and school (Kilbrink & Bjurulf, 2013). The teachers and the supervisors promote

transfer asking the students to transform work processes into drawings or by practicing bending principles in various conditions and for various materials and directions (method).

Collaborative practices also include instructors from the security industry coming to school to teach surveillance law as part of a certificate (Wyszynska Johansson, 2020b). The instructors orchestrate interaction, using self-assessment and peer assessment (method) to support the students to appreciate surveillance law as a specialized field of interconnected but also conflicting meanings, supporting their becoming security officers (Wyszynska Johansson et al., 2019).

In sum, collaborative vocational didactics shows how school and workplaces are intertwined, how vocational teachers, workplace supervisors, and students engage in the student's development of vocational knowledge and skills. Shared understanding of work tasks as content is facilitated but relies on broadening of instruction and reflection to include several parties, i.e., supervisors, workplace staff, teachers, and instructors-practitioners.

6.3 Work-Based Vocational Didactics

In work-based learning, work tasks of varying degree of complexity give access to vocational knowledge and skills or constitute the content as meaning and matter. The daily work tasks and the demands of production constitute content and method in work-based learning in USVET (Fjellström & Kristmansson, 2016). In this context, content prescribed in the school syllabuses becomes peripheral, or rather it can be identified as embedded in work tasks in retrospect (cf. Persson Thunqvist & Gustavsson, 2021) or in advance (Andersson & Lindberg, 2022). Access to work tasks can be planned for and negotiated between vocational teacher, workplace supervisor and student in recurrent tripartite conversations during longer periods or work-based learning in upper secondary apprenticeship education regardless of vocational area (cf. Andersson & Lindberg, 2022).

During the work-based learning periods the students are supervised by co-workers (method). The students observe work processes and participate in tasks that correspond to their level of competence (Kristmansson, 2016; Persson Thunqvist & Gustavsson, 2021). In the workplace then, the supervisors demonstrate, guide and model work tasks to support their students' development of vocational knowledge and skills. They provide comments to the students about their performance in different work processes when it is relevant regarding the student's interaction with customers or clients. During work-based learning the students can also play an active role in claiming access to certain work tasks, e.g., to operate the cash-register or to prepare more advanced meals in the restaurant kitchen (cf. Andersson & Lindberg, 2022; Kristmansson, 2016).

In sum, work-based vocational didactics concerns the students' engagement in work tasks and involvement in the ongoing work processes (methods). Both constitute content

as meaning and matter in relation the demands of production. What knowing in action that each student gain access to during work-based learning is not determined but rather negotiated in interaction between two or more parties e.g., supervisors/co-workers and the student. Occasionally, the vocational teacher has a say in deciding what work tasks become content in work-based didactics.

7 Discussion

This review article explores the boundaries of vocational didactics grounded in theory directed by the two questions: 1) How can vocational didactics be differentiated as a strand in research? 2) What are the emergent features of vocational didactics in USVET?

Addressing the issue of relative invisibility of didactic theory in VET research, the analytic framework we put forth emphasizes the relational interdependence as generic. First, its value is to offer means to explore how the basic operation of pointing is enacted in interaction between the multiplicity of actors involved. Second, to unpack work tasks as a contingent source of content for the development of vocational knowledge and skills. Although we contend that research in VET can be used for a purpose of vocational didactics, e.g., in teaching or supervising we also admit that some boundaries need to be drawn to strengthen the integrity of vocational didactics as a sub-field of both pedagogy and didactics (Gessler & Herrera, 2015). Hence, the proposed framework offers useful conceptualisations to study teaching and learning processes as contingent across VET models and can therefore be used for comparative purposes.

Attending to these generative principles also allows for a better understanding of how vocational didactics evolves in various VET models (Nore, 2015). In relation to the different interests that characterize research on teaching and learning in VET, (cf. Aarkrog, 2011; Bijlsma et al., 2016; Brennan Kemmis & Green, 2013; Filliettaz, 2010; Virtanen et al., 2014) a theoretical base in vocational didactics may in a productive way be applied to study the development of vocational knowledge and skill across the variety of VET models internationally. Through its distinct contribution, vocational didactics responds to the need of further research into the multifaceted variety/manifestation of VET models.

The themes identified in the review zoom in on four distinct features of vocational didactics in USVET: 1) Diversification of the use of simulation as a method in school-based education pointing to vocational knowledge and skills 2) broadening of instruction (and reflection) as a method by inclusion of several parties (e.g., supervisors, workplace staff, instructors-practitioners), 3) work tasks as a method pointing to vocational knowledge and skills as content, 4) interaction between several parties using verbal and non-verbal means actualises the multifaceted content in specific professional areas. These features have shown how contemporary vocational didactics expands our understanding of the content as dynamic

and malleable and the multiplicity of actors in instructive roles, settings, and reciprocal interaction. These features that we have drawn attention to pinpoint the directions of how vocational didactics diversifies and evolves as a field (cf. Fejes et al., 2017b). A strong feature of vocational didactics in Sweden is its interest in verbal and multimodal interaction with a particular focus on student participation in its co-production. The didactic principle of pointing and differentiating is well represented in empirical studies. The national efforts to strengthen workplace-based element of USVET curriculum are, unsurprisingly, mirrored by a growing interest in workplace as learning and teaching environments, impacting vocational didactics as a field. Vocational didactics sheds light on students' activities of shaping individual pathways of participation, bridging school and work. Issues of transfer and integration of knowledge, experiences and identity formation make inroads into vocational didactics. This interest includes guidance, modelling, and instruction by vocational teachers, supervisors, and practitioners in various settings.

The review method adopted enabled a flexible, yet consistent approach to explore the boundaries that we see as demarcating the field of vocational didactics. We chose to construct an analytic framework to guide the analysis iteratively. First, to identify research and then to thematise it with the aim to chisel out four distinct features in the specific context of school-based VET model. The boundaries we draw are based on the three suppositions we adopt constructing our analytic framework, i.e., the contingent nature of learning, differentiation of vocational content into matter and meaning, and integrity of teaching and learning (Gessler & Moreno, 2015; Hiim & Hippe, 2001; Mjelde, 2016; Pahl, 2014).

To conclude, the absence of didactics theory poses a risk of not fully acknowledging the complexity of teaching and learning processes in VET. These processes are sometimes presented as given and unproblematic, posing a risk of reducing didactics to techniques of work-based learning (cf. Brennan Kemmis & Green, 2013; Pahl, 2014) or leaving the content and actors unexamined (cf. Lucas et al., 2012). While school subject didactics primarily focuses on teachers' and students' work in the classroom/workshops, work-based learning primarily focuses on supervisors' and students' engagement in work processes. Vocational didactics must account for the breadth and width of guidance for learning vocational knowledge and skills for professional purposes. This involves developing specialized knowing, transcending the boundaries of subjects and settings (e.g., classroom, workshop, workplace). In intersecting the practices of school and workplace, the issue of balancing the double loyalties, the loyalty to curricular learning outcomes and production-based goals needs to be acknowledge and accounted for in relation to vocational content (cf. Aarkrog, 2011; Berner, 2010; Gessler & Howe, 2015). Vocational didactics offers conceptual means to explicate this delicate balance in VET (Moreno Herrera, 2015; Nore, 2015). The analytic framework we have put forth strengthens the conceptual boundaries of vocational didactics from a point of view of profession-related learning objectives (content), actors, and methods involved.

Ethics Statement

The research for this article was based on written texts available to the public in Swedish libraries and archives. Our research did not involve the direct participation of "human subjects".

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