

Vocational teachers

Understanding continuing professional
development of experienced teachers in
vocational education



Marjanne Hagedoorn

Open Universiteit



Vocational teachers

Understanding continuing professional development
of experienced teachers in vocational education

Colofon

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experienced teachers in vocational education

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“Qualitative researchers need to be storytellers”

Wolcott, 1994 - p. 17

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1

General introduction

INTRODUCTION

Vocational education plays a critical role in preparing students for meaningful participation in vocational practice and for broader societal participation. The quality of vocational teachers is recognized to be key in students' development to become practitioners who are willing and able to be lifelong learners (Zhou et al., 2022). Vocational teachers face ongoing challenges in education and rapid changes in occupational practices, such as technological advancements, educational reforms, and increasingly diverse student populations (Bükki & Fehérvári, 2024; De Bruijn, 2012). To ensure that vocational education remains relevant and of high quality, continuing professional development (CPD) for experienced vocational teachers is crucial.

Despite their vital role, experienced vocational teachers remain an under-researched group in educational literature. While much is known about teacher professional development in general, less attention has been paid to how experienced teachers in vocational education continue to develop professionally within their complex work contexts.

Wired to grow - How practice, curiosity, and research came together

My interest in the development of experienced vocational teachers stems from my own journey through vocational education. After completing a bachelor's degree in Primary Education and a master's degree in educational sciences, I started working as a teacher in vocational education in 2005. I quickly recognised the complexity of teaching in the dynamic context of vocational education, requiring taking student diversity into account, adaptive responding to evolving vocational demands, and the navigation of professional responsibilities within and beyond the teacher team. Working alongside my colleagues shaped my professional development, for example through co-teaching, which helped me grow into classroom management and interacting with students, and supported my professional confidence as a vocational teacher.

As my career evolved as both a teacher and educational advisor, my professional focus expanded beyond student learning to include the development of my colleagues. As I transitioned into the role of educational advisor, my interest in professional development deepened. I designed and implemented professionalisation programmes and initiatives, aiming to support (experienced) teachers and encourage evidence-informed decision-making among advisors and school leaders. Throughout these design and implementation processes, a recurring question continued to guide my thinking: *How do vocational teachers engage in and sustain their professional growth?* Through conversations with teachers, advisors, school leaders, and researchers, I realised this question resonated widely across the field of vocational education, among both practitioners and researchers.

Engaging in practice-based research within my vocational school allowed me to explore how research can contribute to vocational education and its development. I discovered the added value of connecting research with both educational practice and professional development, which motivated me to further develop my role as a researcher. My ambition grew to develop into someone who could connect educational practice and scientific knowledge. This dual motivation, my content-driven curiosity about how vocational teachers experience and sustain their professional development, and my personal ambition to grow as a researcher, came together in the research project that led to this dissertation.

This personal narrative introduces both my motivation for the topic and the focus of the research presented in this dissertation: the CPD of experienced teachers in the context of vocational education. Vocational teachers occupy a unique professional space. Vocational teachers need to maintain expertise in their vocational field while developing pedagogical skills, and they often enter teaching from vocational practice rather than via traditional teacher education. They can be described as a heterogeneous group with respect to their background, ways of preparing for teaching practice, and expertise (De Bruijn et al., 2017; Van der Klink & Streumer, 2017). Educators from different disciplines and different (vocational and general) subjects together are part of multidisciplinary teachers team and are responsible for the educational quality (Bouwman et al., 2019b; Oude Groote Beverborg et al., 2015; Truijen et al., 2013).

A vocational teacher's story

“When I first started teaching in the business domain, I wasn't sure what to expect. For years, I had worked in finance, and stepping into the classroom felt like entering a different world. My students are learning to become office managers and financial assistants, and I try to connect everything we do to real workplace situations. Teaching isn't just standing in front of a class: I coach students during their internships, help develop new educational programs with my colleagues, and work on projects with companies in the region. It's challenging to combine all these tasks, but I keep learning. I've learned more about pedagogy and teamwork here than I ever expected. What I like most is that my students see I'm still learning too. In vocational education, learning goes both ways: between teacher and student, and between school and vocational practice.”

The learning needs of experienced teachers are distinct. Their development is less about acquiring foundational teaching skills and more about refining, adapting, and deepening their practice (Kyndt et al., 2016; Seidel et al., 2021; Van Renselaar et al., 2025; Van Tartwijk et al., 2023). They are expected to pursue self-directed professional growth, enabling them to remain responsive to changing educational and vocational demands. Therefore,

understanding how experienced teachers continue to develop professionally is essential for effectively supporting their lifelong learning.

The aim of this dissertation is to gain comprehensive understanding of *how* experienced vocational teachers develop professionally: which activities do they undertake to develop, to what learning outcomes do these activities lead, and what factors support their learning. These three aspects are studied in connection to understand vocational teachers' CPD. In the next section, the core concepts used in this dissertation are explained in more detail.

THEORETICAL LENSES

This dissertation explores CPD from a sociocultural perspective on learning (Evans, 2019; Lave & Wenger, 1991) viewing professional development as an inherently social process embedded in daily practice, where teachers continuously develop through interaction with others, and participation in the cultural contexts of teaching (Billett et al., 2018; Borko, 2004).

The nature of *vocational education* is characterized by the interplay between the rationale of education and that of work, making it inherently versatile as it integrates theory, practice, ethics, and collaboration with multiple partners inside and outside the school. Within this multifaceted nature of vocational education teachers are required to be both pedagogically skilled and professionally grounded in the vocational practice they educate their students for (Andersson & Köpsén, 2018; Cedefop, 2025; Hoekstra et al., 2018; Zhou et al., 2023). For vocational teachers specifically, CPD extends beyond classroom teaching to encompass their full work context, as they act as boundary crossers between teaching and vocational practice (Akkerman & Bakker, 2011; De Bruijn, 2012; Zhou et al., 2023). Furthermore, in line with a sociocultural perspective on CPD, in their daily practice, vocational teachers not only develop themselves but also contribute to changes within their professional practice, i.e. vocational teaching practice (Emans et al., 2025). Vocational education is a tertiary education sector that prepares students for employment, but also for participation in vocational communities and lifelong development as practitioners (Cedefop, 2022). In the Netherlands, vocational education represents the second largest educational sector, serving a majority of young people (aged >15) (De Bruijn et al., 2024).

In this dissertation, *CPD* is defined as a continuous process of learning throughout teachers' careers, characterised by engagement in both formal and informal *professional development activities*, that range from attending structured trainings and conferences to spontaneous workplace learning during teaching, collaboration, and experimentation (Akiba & Liang, 2016; Clandinin et al., 2009; Darling-Hammond & Richardson, 2009; Kyndt

et al., 2016; Sancar et al., 2021). The professional development activities can be elicited by teachers themselves or organised by others externally or in the teachers' work environment (Ballangrud & Nilsen, 2021; Hoekstra et al., 2018). These activities elicit learning and might lead to diverse learning outcomes being cognitive, affective, and practical in nature (Eraut, 2007). That is, they involve changes in how teachers think and act. To study the full extent of *learning outcomes* of vocational teachers' CPD in this dissertation two analytical dimensions are used. The first dimension of learning outcomes focussed on experienced changes in thinking and acting (including knowledge, beliefs, emotions, intentions, and practices) (Bakkenes et al., 2010), and the second dimension of learning outcomes focussed on teachers' articulated knowledge (Schaap et al., 2009; 2011).

Various *factors* contribute to vocational teachers' learning. For example, collective participation and interaction with others can tribute to learning of teachers. Teachers discuss their ideas, ask for help in challenging tasks, give feedback, or model their actions (Cirkony et al., 2024; Korthagen et al., 2006; Van Veen et al., 2012;). Teacher learning is also supported when they are actively involved in discussing or researching issues (Babichko et al., 2024; Garet et al., 2001; Merchie et al., 2018;). Clear learning goals, reflection, sustained and intensive involvement in professional development activities, and alignment with teachers' own practices, knowledge, and beliefs are other factors that contribute to teachers' learning (Desimone, 2009; Latham & Locke, 2006; Salo et al., 2024; Van den Bergh et al., 2014). In addition to these factors, there are also more personal factors and work environment conditions that stimulate teachers to learn, such as teachers' personal interest in a topic, feeling challenged or school structure, that can enhance teachers' learning (Hubers et al., 2022; Kyndt et al., 2018). All of these factors are considered potentially relevant to contribute to teachers' CPD.

AIM AND RESEARCH QUESTION OF THIS DISSERTATION

The aim of this dissertation is to gain comprehensive understanding of how experienced vocational teachers develop professionally.

The main research question of this dissertation is: *How do experienced vocational teachers develop professionally?*

To answer this main question in a cohesive manner, we explore how teachers articulate their professional development. Teachers explicate which activities trigger their learning, what learning outcomes they experience, and which factors contribute to their learning.

By following teachers over time in a longitudinal study, we aimed to gain insight into the CPD of experienced vocational teachers. All the studies employ a qualitative and descrip-

tive research design. To explore vocational teachers' CPD, in terms of activities, learning outcomes, and factors, we used learner reports, semi-structured interviews, and concept maps. These instruments were also used to illustrate CPD through narrative analysis. These narratives reveal how activities, learning outcomes, and contributing factors are interrelated and form a coherent whole in vocational teachers' CPD. To transcend the specificity of a single occupational field, the studies were conducted in two contrasting domains: business and welfare. A total of 26 experienced teachers from five vocational schools participated in the research. Appendix A provides an overview of the studies in which each teacher participated.

CONTEXT OF THIS DISSERTATION

The research described in this dissertation is conducted in the context of Dutch Senior Secondary Vocational Education at level 2–4 of the European Qualification framework (EQF) (in Dutch: *mbo, Middelbaar Beroepsonderwijs*). In the Netherlands, vocational education is a substantial part of the public educational system. Students in Dutch vocational education are mostly young people (aged >15). Programmes in vocational education take place in full-time school-based vocational education combined with apprenticeships in companies, or in dual programmes in which students work as employees, supported by one or two days of school-based learning.

As stated earlier, teachers in vocational education can be described as a heterogeneous group with respect to their background, ways of preparing for teaching practice, and expertise (Bruijn et al., 2017; Van der Klink & Streumer, 2017). Teachers from different disciplines and different (vocational and general) subjects together are part of multidisciplinary teacher teams (Oude Grote Beverborg et al., 2015). As in Australia, Sweden, and Germany, for the majority of Dutch vocational teachers, teaching is a second career. They previously worked in the vocational practice for which they now prepare students.

There is no fixed route to follow to become a teacher in vocational education (Van der Klink & Streumer, 2017; Van Renselaar et al., 2025). Most vocational teachers have participated in a relatively short professional development trajectory in which they receive a qualification for teaching in vocational education (in Dutch called *PDG, Pedagogisch Didactisch Getuigschrift*), or they engage in regular (often parttime) bachelor-level initial teacher education in a more general subject. Vocational teachers who participated in the research in this dissertation teach vocational subjects, such as baby care skills or accountancy, and mostly teach in school-based vocational education.

RELEVANCE OF THIS DISSERTATION

The **scientific relevance** of this dissertation lies in its contribution to understand vocational teachers' CPD through in-depth qualitative studies. Despite extensive research on CPD of teachers in other educational contexts, experienced vocational teachers remain underrepresented (Andersson et al., 2018). Studies predominantly focus on primary and secondary education (e.g. Anderson & Taner, 2023; Gaines et al., 2019; Lecat et al., 2019), beginning teachers (e.g. Colognesi et al., 2019; Gagnon & Dubeau, 2023; Mesker et al., 2018; Van Renselaar et al., 2025) or professional development related to specific interventions (e.g. De Groot-Reuvekamp et al., 2018; Nijland & Vermeulen, 2025; Powell & Bodur, 2019; Van Vijfeijken et al., 2024). The few studies on vocational teachers' professional development examine team learning (e.g. Bouwmans et al., 2019a), learning related to specific innovations or aspects of teaching (e.g. Sandal, 2023; Wildeman et al., 2022), or teaching competence (e.g. Bound, 2011; Messmann & Mulder, 2011; Tapani & Salonen, 2019; Vähäsantanen et al., 2008). Moreover, CPD research typically emphasises teacher learning regarding student-teacher interactions in classrooms, which does not capture the broad scope of the teaching vocation and multifaceted nature of vocational education practice involving diverse tasks, stakeholders, and contexts beyond the classroom. This dissertation addresses that gap by exploring experienced vocational teachers' CPD from their own perspective, adopting a holistic view of the teacher vocation and its CPD through a longitudinal design.

The **practical relevance** of this dissertation is rooted in challenges vocational schools face in fostering CPD. While school leaders recognise the importance of CPD for maintaining quality, they often struggle to support teachers effectively (Bouwmans et al., 2017; Mičiulienė, 2023; Van der Klink & Streumer, 2017; Zhou et al., 2022). Vocational education practice requires tailored approaches to support CPD and shared language for dialogue about CPD. By offering insights into how, what, and why vocational teachers learn, the research in this dissertation helps teacher teams, school leaders, and policy makers make informed decisions about supporting CPD and facilitating deeper reflection on vocational teachers' CPD.

The insights from this dissertation can stimulate continuous dialogue about teacher learning, and the results highlight the importance of creating learning environments that acknowledge both formal and informal learning, as well as teachers' personal motivations and workplace conditions for learning. Ultimately, better understanding of vocational teachers' CPD contributes to building schools as learning organisations and improving teacher quality.

OVERVIEW OF THE DISSERTATION

This dissertation consists of four interconnected studies that together provide a comprehensive understanding of the CPD of experienced vocational teachers. The relation between the four studies and chapters is visualised in Figure 1.1.

Chapter 2: Mapping informal and formal professional development activities of vocational teachers

This chapter involves an exploratory study. In **Chapter 2** a study is presented which explored the types of professional development activities undertaken by experienced vocational teachers. Using learner reports, in which 26 teachers explicated their professional development activities, this study identifies a wide range of formal and informal activities that stimulate vocational teachers' learning and that reflect the specific nature of vocational teaching practice. To this end, the following research question was formulated: *What type of formal and informal professional development activities do vocational teachers engage in?*

Chapter 3: Vocational teachers' continuing professional development: Activities, learning outcomes and factors

In **Chapter 3** a study is presented that builds on **Chapter 2**. This study adds semi-structured interviews to the learner report method used in **Chapter 2**, to gain deeper insight into the professional development of 12 experienced vocational teachers. This study characterises CPD in terms of the activities teachers engage in, the changes they perceive in their thinking and acting (the first dimension of learning outcomes), and the factors that contribute to their learning. The research question for this study was: *What are the characteristics of the CPD of vocational teachers in terms of activities that elicit learning, perceived changes in thinking and acting, content of these changes and contributing factors?*

Chapter 4: Characterising vocational teachers' knowledge: Nature and content

In **Chapter 4** the focus shifts to the second dimension of learning outcomes: the nature and content of vocational teachers' knowledge. Using concept mapping, this study reveals the content and nature of knowledge of 22 teachers and how this reflects the complexity and specificity of vocational education. The following research question was formulated: *What characterises the knowledge of experienced vocational teachers?*

Chapter 5: Narratives of vocational teachers' continuing professional development

In **Chapter 5**, the methods used in the previous studies, that is learner reports, semi-structured interviews, and concept maps, are integrated to create narratives of the CPD of three experienced vocational teachers. This study highlights how CPD unfolds in practice for teachers with different professional orientations, offering an in-depth view of their professional development. The research question for this study was: *What illustrates the*

continuing professional development of experienced vocational teachers with different professional orientations?

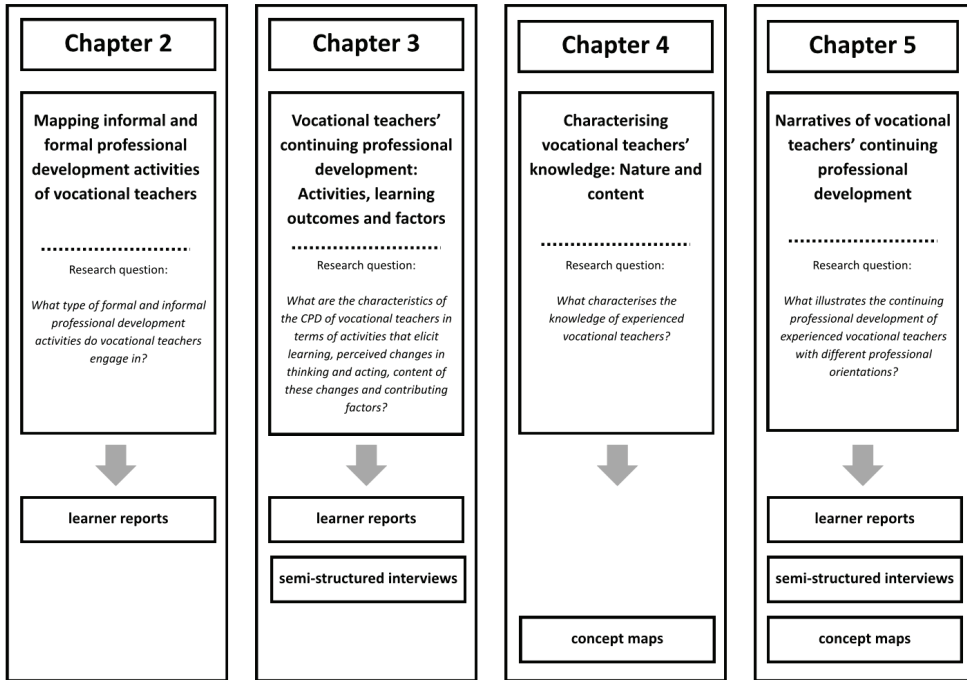


Figure 1.1. The relation between the four studies and chapters.

Note to reader

The chapters are written as individual research papers and are therefore independent pieces of text. This may lead to some overlap. **Chapter 2, 3 and 4** are published in peer-reviewed scientific journals and **Chapter 5** is submitted for publication.

2

Mapping informal and formal professional development activities of vocational teachers

ABSTRACT

Vocational teachers continuously tailor their teaching to changes in vocational practice, technologies, and student diversity. Continuing professional development is crucial for dealing with these changes. A longitudinal study was conducted to study the professional development activities of vocational teachers in the Netherlands. It resulted in a typology of formal and informal professional development activities. This typology consolidates preceding typologies, and specifies these for the context of vocational education. During a two-and-a-half year period, 26 experienced teachers detailed their informal and formal professional development activities in learner reports. The 386 activities identified were grouped in six categories of informal professional development activities and in five categories of formal activities. In total, three quarters of the activities could be characterised as informal, embedded in daily practice. Our typology could encourage vocational schools in facilitating professional development more effectively.

Keywords

Learning activities; professional development; vocational education and training; experienced teachers; learner report

This chapter is based on:

Hagedoorn, M., Koopman, M., Bouwmans, M., & de Bruijn, E. (2023). One size does not fit all - mapping informal and formal professional development activities of vocational teachers. *Teachers and Teaching: Theory and Practice*, 31(3), 372-392. <https://doi.org/10.1080/13540602.2023.2276743>

INTRODUCTION

Continuous changes in vocational practice, technologies, and student diversity, require teachers in Vocational Education and Training (VET) to constantly tailor their teaching to these factors (Hoekstra et al., 2018). Continuing professional development (CPD)¹ is crucial for dealing with these changes (Andersson & Köpsén, 2018).

Vocational teachers' professional development is embedded in the social practice of their school (Andersson et al., 2018). This perspective on professional development implies that their workplace affords teachers' formal and informal professional development activities, by which they further develop their knowledge, their beliefs, routines, and actions. Informal activities are mostly implicit and spontaneous, for example experimenting with a new teaching approach with colleagues. Formal activities are organised activities for the purpose of learning, such as participating in a training on the latest digital tool (Rodriguez-Gomez et al., 2019).

While research on CPD in general is growing (De Jong et al., 2022; Lecat et al., 2019), research on vocational teachers' formal and informal professional development activities is relatively scarce (Andersson et al., 2018). Research on individual CPD is mainly conducted in the contexts of primary and secondary education, often focusing on student and novice teachers or carried out in the context of a specific intervention, setting, or innovation (Lecat et al., 2019). The few studies that do describe vocational teachers learning frequently concern team learning, focus on either formal or informal professional development activities, or focus on the development of specific knowledge and skills (e.g. Sandal, 2021; Wildeman et al., 2022). Hence, there is no comprehensive typology of professional development activities relevant and specified for vocational teachers. From the perspective of CPD as situated in daily work and therefore embedded in practice, this article presents the results of a longitudinal study among Dutch vocational teachers to better understand and typify CPD activities of vocational teachers.

1 For clarity and consistency, the term "continuing professional development (CPD)" is used here; the published article referred to it as "teacher professional development (TPD)."

THEORETICAL BACKGROUND

In this study CPD is framed from a sociocultural perspective on learning (Billett, 2001b), viewing CPD of vocational teachers as situated in their daily work (Evans, 2019). From this perspective, how teachers learn and the situation in which they learn are considered fundamental for their learning. CPD arises through teachers' own particular circumstances and experiences in daily work situations. What teachers value and learn in these situations is directed through personal needs, engagement, and dispositions (Billett et al., 2018). In line with our situated perspective on CPD, these learning situations involve participating in and contributing to communities of practice together with significant others (Edwards, 2005). Vocational teachers interact and work together in teams, in various communities and with various stakeholders, such as students, colleagues, and workplace supervisors. These significant others provide teachers with opportunities that are crucial and stimulating for their professional development (Zhou et al., 2023).

Following our situated perspective, to develop professionally, while working, vocational teachers engage in different types of professional development activities, both formal and informal in nature (Lecat et al., 2019). Activities are part of teachers' daily work and serve as catalyst for expanding teachers' (practical) knowledge, changing their views, beliefs, awareness, and judgement, and elaborating their repertoire of actions (Akkerman & Bruining, 2016; Zeng, 2020). These activities are elicited in interaction with the work environment by teachers themselves and by events and actors in their environment (Poell et al., 2018). In this study, we define CPD as a continuous process characterised by teachers engaging actively in professional development activities.

To understand CPD as a continuous process situated in teachers' daily teaching context, it is important to capture the wide range of professional development activities teachers engage in (Akiba, 2012). A typification of vocational CPD cannot be limited solely to intentional activities. From our situated perspective on CPD, teachers are expected to undertake both formal activities as well as engage in informal activities that might encourage CPD (Kyndt et al., 2016; Lecat et al., 2019; Spaan et al., 2016).

Following our theoretical stance CPD can be supported by formal activities. In the past decade, many studies are carried out in the context of a specific programme or intervention (Akiba, 2012). These activities—such as courses and programmes—are planned and structured in terms of time, space, goals, and support and can encompass multiple learning activities and experiences that elicit professional development (Kyndt et al., 2016). They provide teachers with dedicated time to exchange ideas and collaborate, and they provide access to significant others, such as peers and experts (Jones & Dexter, 2014). From our view on CPD, a single focus on formal activities disregards the variation of formal activities teachers engage in.

As CPD is situated in teaching practice, teachers' practice affords a substantial amount of spontaneous learning opportunities (Billett et al., 2018), such as learning from disruptive events during teaching, learning from co-designing a course, or learning through participating in a team meeting. Informal activities are omnipresent in teacher practice and occur both individually and in collaboration with others (Eraut, 2004; Kyndt et al., 2016). Gairín Sallán et al. (2022) and Noe et al. (2013) argue that approximately seventy-five percent of what is learned by professionals takes place through so-called informal development activities.

To meet the aim of this study, to study CPD from a situated perspective and to develop a comprehensive typology of both formal and informal activities vocational teachers engage in, we use two frameworks on teachers' professional development activities that emphasise the situated nature of teacher learning (Akiba, 2012; Kyndt et al., 2016). Firstly, the overview of Akiba (2012) was used to examine formal activities in the context of CPD defining it as situated. This framework provides a wide range of formal activities teachers engage in within immediate work context and broader professional contexts. Drawing from this study, we used five types of formal activities, namely participating in programmes, courses, mentoring, visiting professional conferences, and participating in formal teacher collaboration. Secondly, the overview of Kyndt et al. (2016) was used to characterise informal activities of vocational teachers. Because research focused on informal activities of vocational teachers is limited, alternatively the meta-analysis conducted by Kyndt and colleagues (2016) in the context of primary and secondary education serves as a thorough framework to examine vocational teachers' informal activities. Drawing from their study, we used seven different categories of informal learning activities, for example learning through interacting and discussing with others, learning from practicing, and testing, or learning through consulting information sources. From our situated perspective on CPD, the overviews of Akiba (2012) and Kyndt et al. (2016) formed the foundation to create our typology and characterize the range of formal and informal activities vocational teachers engage in. The following research question was formulated: *What type of formal and informal professional development activities do vocational teachers engage in?*

METHOD

Sample

This study was conducted in Dutch Senior Secondary Vocational Education at level 2 to 4 of the European Qualification framework, further referred to as vocational education. In the Netherlands, vocational education is a substantial subsystem of the public educational system, wherein students prepare for vocational practice through initial vocational training (De Bruijn et al., 2017). Training programmes take place in full-time vocational

education within schools and in companies in the form of apprenticeship, and in dual programmes in which students are employees. This study focuses on vocational teachers who teach in the full-time programmes. To transcend the specificity of one domain, participants were recruited in two contrasting domains: the domain of business and that of welfare. Participants were selected by using purposive sampling (Cohen et al., 2002). Selection criteria were based on the domain (business or welfare), teaching experience (>5 years; Berliner, 1994; Hoekstra et al., 2009), contract hours (>3 days per week), and scheduled contact time with students (>8 hours per week).

All vocational subject teachers of 30 vocational schools were invited to participate by the first author. The invitation consisted of an information letter sent through the author’s network and a message on social media. This resulted in 33 registrations of experienced teachers from five different vocational schools. Due to time constraints, illness, and retirement, seven participants opted out during the first year. The data of the 26 remaining participants that participated throughout the study were included in the analysis (see Table 2.1). All participants took part in this study voluntarily and signed an informed consent form that was reviewed by the ethics committee of HU University of Applied Sciences Utrecht (project no. 2019–01).

Table 2.1. Demographic information

Variable name	n	Mean (range)	Domain of welfare	Domain of business
Participants	26		15	11
Gender				
Female	16		12	4
Male	10		3	7
Age		44 (range 27-59)		
Educational degree				
Bachelor	14		10	4
Master	12		5	7
Work experience		11,6 years (range 5-18)		
Associated with educational programmes and courses			Social care Social work Pedagogical work	Trade Sales Accountancy Management assistant

Data collection and instruments

Learner reports (Van Kesteren, 1993) were used to gather self-reported rich and in-depth descriptions of professional development activities, both formal and informal. The format of Meirink et al. (2007) was used redesigned and based on a pilot study for the spe-

cific context of vocational education. It consisted of a guideline with mainly open-ended questions (Appendix B).

In a longitudinal study participants were asked to complete online learner reports six times during two-and-a-half-years (2018 through 2020). Participants who completed more than four learner reports were included in the study. This resulted in a response of 138 learner reports. In each learner report, participants described the professional development activities they undertook (<5). On average, each teacher described 15 activities over the two-and-a-half-year period of data collection (ranging from 8 to 26 per teacher). After receiving a learner report, when a learner report lacked detail the first author carried out a member check by phone to gather additional information.

Data analysis

The 138 learner reports contained 386 unique activities. To analyse the activities, a template was developed based on the typology of Kyndt et al. (2016) to categorise the informal development activities and on the typology of Akiba (2012) to categorise the formal development activities. To align with the context of vocational education, adjustments were made to the template during the categorization process. To increase coding process reliability, these adjustments were discussed in the research team until consensus was reached. 50 professional development activities were analysed separately by the first and third author to determine inter-rater reliability. They both assigned 150 codes, of which 119 codes were found to be identical (79%), after which contrasting codes were discussed until agreement was reached. This categorisation process resulted in the reformulation of two types of activities. Learning from 'reflecting in and on action' was reformulated into 'reflection and evaluation'. Learning from 'practicing and testing' was reformulated and split as 'the primary process of teaching and coaching students' and 'experimenting and innovating'. Moreover, two types of activities described by Kyndt et al. (2016) were not reflected in the dataset and therefore excluded from the template ('encountering difficulties' and 'learning from others, without interaction'). The final template was used to identify the frequency and nature of CPD activities relevant and specified for vocational education. The classification of the types of CPD activities was used to present the results.

RESULTS

Data revealed six types of informal professional development activities and five types of formal activities (presented in italics). Table 2.2 shows the typology and frequencies. A complete overview of the results is provided in Appendix C. The subsequent paragraphs list the type of informal or formal development activities, sequenced from most to least coded. To elucidate these activities, results are presented with a description of the activity. This is substantiated with quotes and examples from learner reports.

Table 2.2. Frequencies of informal and formal professional development activities

	f	Type of CPD activities	f	Subtype of CPD activities
Informal	292	The primary process of teaching and coaching students	82	(co-)teaching and coaching, (co-) marking students
		Interaction, discussion, collaboration, and sharing with others	64	Collaborating, receiving feedback
		Engaging in tasks, roles, and extracurricular activities	53	Coordinating and organising, coaching colleagues and student teachers
		Consulting (offline/online) information sources	37	Reading and studying, researching
		Experimenting and innovating	33	Designing new educational programmes, (digital) experimenting in curriculum activities
		Reflection and evaluation	23	Reviewing the curriculum, receiving collegial consultation
Formal	94	Professional development programmes	58	Participating in a school (online) learning activity, taking part in (online) professional training or course organised by experts
		Courses for a degree or credits	18	Attending a programme for a degree, taking part in a course for professional development credits
		Receiving structural coaching	11	Receiving coaching, participating in peer coaching
		Attending a professional conference	4	Visiting an educational conference, visiting a vocational conference
		Participating in formal teacher collaboration	2	Participating in a professional learning community in school, participating in a teacher network

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Informal development activities

Firstly, informal professional development activities in *the primary process of teaching and coaching students* encourage teachers to develop. This type of activities involves teaching a subject in class and coaching students in practice in cooperation with others, such as workplace supervisors. A business teacher gives an example of learning while coaching individual students:

I visited a student during her internship, together with her supervisor we discussed her learning process ... This conversation showed that you can look at student actions differently than only from a school perspective.

Coaching students is not a solitary undertaking; teachers mentioned significant others in these learning activities. For example, one business teacher mentioned talks with his student and several others:

One of my students has an anxiety disorder. We meet with the student, the student-care coordinator and the student's father every month. ... This meeting showed me how to guide this student and how to anticipate the signs.

Participants mentioned several collaborative teaching activities, both with colleagues of their school, universities of applied sciences, or vocational practice, that encouraged their learning, including co-preparing curriculum activities, co-teaching, and co-assessing students.

Secondly, teachers mentioned activities in which they *interact, discuss, collaborate, and share with others*, inside and outside of school as triggers for learning. Inside schools, these activities are mostly about the social environment of their teacher team or school and about the process of teaching, for example dealing with the continuous flow of innovations or using a new online teaching tool. Such activities are often spontaneous meetings in the hallway, planned meetings, or projects with colleagues or students. During these conversations with others, teachers ask and receive feedback on their daily work. A welfare teacher illustrated the value of feedback from a student-teacher in her teacher team:

I asked my colleague, a student-teacher, to observe me during my daily work. ... I received feedback about my physical posture in front of the classroom. Because of this feedback, I have become more aware of the way I carry myself. This sharpens my skills as a teacher.

Outside of school, triggers for learning are meetings and collaborations with colleagues from other vocational schools and workplaces. As this business teacher illustrated:

I talked to a workplace supervisor about vocational education. He explained that students need skills and qualifications other than currently taught. ... The insights were instructive for me. It encouraged me to approach other companies to further investigate vocational developments.

Thirdly, vocational teachers mention that they learn from *engaging in tasks, roles, and extracurricular activities*. Executing tasks and roles are for example coordinating students' internships, organising training for colleagues, and coaching colleagues or student teachers. Extracurricular activities are for example going abroad and applying for roles and tasks outside their own teacher team. Other actors involved in these activities include colleagues from their own (and other) vocational schools or universities of applied sciences, students, stakeholders, or external experts. Such activities are mostly about the organisational structure and social environment in schools and can be characterised

by contacts with stakeholders. A welfare teacher gives an example of learning through executing tasks and roles:

Within the teacher team, I have the task of coordinating students' internships. During my search for internships, I entered a conversation with an organisation. ... I learned how to take the initiative and I now look differently at the collaboration between education and the occupational field.

Fourthly, teachers point out that they *consult offline or online information sources* to seek, read, and study information about the developments in the vocational field, teaching, and the characteristics of students, for example about how to stimulate students' self-efficacy. Such information is consulted based on a research question, evaluation question, learning question or a general interest in a topic. A teacher from the welfare domain illustrates:

A GPS-watch ensures the safety of people in need and enables them to continue to live at home. This is a part of our educational programme. To teach about this, I took this watch home and explored its functions. ... I now know how it works and how it contributes to freedom of people in need.

Although these activities are mostly individual undertakings, teachers mentioned their own colleagues and experts outside of the school as actors in this type of activity.

Fifthly, experimenting and innovating involves designing and trying out new things and has different scopes and degrees of complexity. These activities are mostly about teaching and characteristics of students. Teachers' own colleagues, students, and colleagues from universities of applied sciences were mentioned as actors in these activities. An example from the welfare domain, of learning during experimenting in their own lessons is:

I tried out a different group composition. ... This setting made it possible for me to coach students better during lessons. I learned I need to focus more on group composition when preparing and performing lessons.

Teachers also mention implementing technological and digital innovations, for example experimenting with a new assessment tool or implementing new healthcare technology in educational programmes. An example of learning during experimenting outside their own lessons from the business domain is:

In our school, we started a new educational concept: students learn through integrated vocational assignments. All curriculum activities must connect to these as-

signments. This is a challenge for me and my colleagues. ... I learned that a shared vision and leadership are essential to succeed in this kind of major changes.

Finally, teachers *reflect and evaluate* when looking back on and looking forward to collaboration, curriculum activities, tasks, projects, or lessons. These reflection and evaluation activities are mostly about the social environment of their teacher team or school and about teachers' personal insights into their own learning, such as coping with their workload or exploring personal career development ambitions. Teachers mention others who participate in these activities, for example colleagues, students, vocational stakeholders, and professionals outside the work context, such as a career coach. An example of learning during an evaluation session with colleagues from the business domain is:

In our teacher team, we scheduled an evaluation of our educational programme. My colleagues and I feel the urge to innovate, but we are limited in terms of what we can influence. ... I learned that there is a discontinuity in what my colleagues say and what they actually do.

Formal development activities

Firstly, formal professional development activities that encourage the learning of teachers are organised *professional development programmes*. These activities mostly relate to the process of teaching, student characteristics, and developments regarding teaching in vocational education, for example about a new educational design for education. A teacher from the welfare domain explained:

The training was together with my colleagues, provided by the examination supplier. ... I learned the importance of objectivity in the assessment process and which questions activate students' reflection.

Vocational teachers also described formal activities organised as part of a hobby, voluntary work, or other jobs as activities that encouraged them to develop as teachers. An example from the business domain:

As part of a training for new city councilors, I prepared and executed a pitch for people I did not know. ... I learned to step out of my comfort-zone. And because I experienced it myself, I think I'm better able to coach and assess students for their pitches.

Secondly, teachers mention learning during *participating in organised courses* that result in degrees or credits. This includes attending a master's degree programme, in which teachers' own colleagues and experts, such as supervisors, are actors. As a welfare teacher put it:

As part of a master's degree programme, I conducted research into how to map and anticipate the support needs of student groups. ... I gained knowledge about the research process itself.

This type of formal development activities are mostly about teachers' personal insights into their learning and about new developments in vocational teaching, for example a course about talent-focused teaching.

Thirdly, planned *coaching* sessions with a buddy, professional career coach, psychologist, occupational physician, or a confidential counsellor support and encourage teachers and teacher teams in their professional development. An example from the welfare domain:

Within the teacher team, I have a buddy [colleague] who helps me figure out where my development points and learning goals lie. I was able to express this concretely in conversation with her. ... I started thinking more consciously about my own development. I realised that I can influence that myself.

This type of formal development activities are mostly about teachers' personal insights about their own learning and about the social environment of their teacher team, for example about the culture and management style influencing professional development.

Fourthly, teachers describe *attending a conference* as 'an opportunity to gain more knowledge and theoretical information, and to connect it to my own teacher practice' (welfare teacher). Attending conferences is not an individual endeavour; teachers mention their colleagues, experts, and stakeholders from vocational practice as actors in these activities. Teachers mentioned two types of conferences, namely conferences about teaching or learning in the context of vocational education and conferences about the developments in a vocational domain or labour market, for example about online marketing in business domain.

Finally, *formal teacher collaborations* can take the shape of professional learning communities, study groups, or teacher networks other than the teachers' own teacher team, for the purpose of learning, improving teaching, and innovating educational programmes. Teachers mention these activities are about the way of working together in their schools and developments in the vocations students are being educated for. Teachers mention colleagues from their own or other vocational schools, experts, and teachers from universities of applied sciences as actors in these types of collaborative activities. An example from the business domain:

I participated in a learning community with colleagues from other teacher teams. An expert chaired these meetings. Our community focused on innovating the

educational programmes in the domain of economics. ... During this process, I learned about other perspectives on education from my colleagues and I gained more knowledge on the influence of management on changes in school.

CONCLUSIONS AND DISCUSSION

In this study, the research question of what type of formal and informal professional development activities vocational teachers engage in was addressed. The findings reflect activities relevant and specified for teaching in vocational education. We identified 11 types of activities that encourage their development. In line with previous research on CPD (e.g. Gairín Sallán et al., 2022), three quarters of the 386 activities teachers reported could be characterised as informal. The remaining 94 activities could be characterised as formal. The number of described activities indicate that experienced vocational teachers, unlike some researchers state (see Kyndt et al., 2016), stay active in participating in both informal and formal activities, are eager to learn, and find CPD evident as their careers progress.

Creating a typology of formal and informal activities revealed an important distinction in the nature of formal and informal activities as well as in the manner in which these activities are usually conceptualised and distinguished in research on CPD. On the one hand, formal professional development activities are usually described as pre-designed *settings* which may encourage teacher learning. The design of such settings ideally incorporates elements of effective professional development described in a large number of studies (e.g. Wildeman et al., 2022) that are likely to contribute to the actual learning processes or activities of teachers themselves. The learning processes and activities occurring within these settings are harder to pinpoint in many of those studies. On the other hand, the activities described to be undertaken by teachers in informal professional development can often be regarded as actual *learning activities*: the teacher performs an activity, such as reading, interacting, or experimenting, and this learning takes place during their daily work. This distinction can be nuanced by the observation that formal activities may also provide teachers with opportunities to engage in a variety of informal development activities in their workplace context (Spaan et al., 2016). In our view, the distinction between formal and informal development contributes to understanding CPD in the context of vocational education and provide school leaders and policy makers with a rich overview of both formal and informal professional development activities that can be fostered. In our view, this is at odds with the traditional views on CPD in Dutch vocational education, which is mostly formal in nature.

Our qualitative research illustrates that CPD has characteristics that appear to be specific to teaching in vocational education. Firstly, our findings show vocational teachers mostly

develop themselves in the primary process of teaching, particularly related to coaching students. Dutch vocational teachers often consider themselves to be both coaches and teachers as opposed to merely teaching students (Wesselink & Zitter, 2017). In contrast to teachers in primary and secondary education, coaching (groups of) young and adult students in both school and in vocational practice is a vital element of vocational teachers' work. For example, they teach vocational subjects in school, coach career learning, and coach work-based parts of educational programmes (Andersson et al., 2018).

Secondly, teaching in vocational education is anything but an individualistic profession and is not limited to schools. In contrast to Kyndt et al. (2016), we found that vocational teachers develop themselves not only with the help of their colleagues, moreover, others like students, stakeholders from vocational practice, and professionals outside of their own school are partners in CPD. Most importantly, co-teaching, co-designing, and co-assessing, together with colleagues and workplace supervisors, characterise the daily work of teachers and encourage them to develop. In this respect, Andersson and colleagues (2018) refer to the 'boundary-crossing character' of vocational teachers' work: they constantly cross the boundary between the community of the school and the community of the vocational practice. Working together with stakeholders from vocational practice is shown to provide vocational teachers with opportunities for learning about innovations in the vocational domain, labour market developments, or vocational subject matter, which helps them to keep their vocational expertise up to date (Andersson & Köpsén, 2018). While vocational teachers generally learn in interaction with others, an exception can be made for consulting (offline/online) information sources as a more individualistic informal activity. These results are congruent with our situated perspective on CPD and support a mainly collective approach to CPD in vocational education (cf. Ballangrud & Nilsen, 2021).

Thirdly, experimenting in lessons and innovating educational programmes elicit professional development of vocational teachers. Research from primary and secondary education emphasises experienced teachers' learning through experimenting (Kyndt et al., 2016). Our study in vocational education makes visible that innovating is an important part of Dutch vocational teacher's daily practice, requiring them to continuously adapt and re-design vocational curricula based on developments in occupational practice, new views on education, and student diversity. In line with Lambriex-Schmitz and colleagues (2020), our study makes clear that teachers' play an active role in school innovations and, therefore, function as a key factor for adaptability and quality of vocational education.

Finally, we found that the learning of vocational teachers does not solely relate to improving teaching practice or gaining more insights into developments in vocational practice; it also relates to their development as a professional. For example, teachers learn about how to cooperate with colleagues and stakeholders, or they gain insight into their own

learning process which helps them professionalise. This could be explained by their career stage, as CPD of more experienced teachers tends to focus less on teaching practice and more on the wider context of their job (cf. Kyndt et al., 2016). This wide range of professional learning content accentuates the dependence of CPD on individual tasks and roles, and diverse learning needs of vocational teachers.

In sum, our findings show that CPD in vocational education is encouraged in a way specific for the context of vocational education and its characteristics. Although there are some similarities to CPD in primary and secondary education, our results show that CPD in vocational education is connected to multiple actors inside and outside schools and to continuously re-designing curricula. These conditions of teaching in vocational education are reflected in the focus of CPD activities, which—like in primary and secondary education—are tailored to the specific teachers' needs and work context.

Limitations and suggestions for further research

Our study has some limitations. Firstly, this study was conducted in the Netherlands, in which the vocational programme is part of the formal public education system and is predominantly school-based. We think our findings are relevant for countries in which vocational education is more or less similar positioned, for example in Scandinavian countries, however, our study might also be relevant for countries with dual systems, for example in Germany (Busemeyer & Trampusch, 2012). A follow-up study could focus on CPD activities in these systems. Secondly, the research was limited to teachers' self-reported professional development activities. Future research could use additional research methods, such as observations, to further enrich our data with the actual performance of the activities by teachers. Thirdly, the learner report was designed to collect single self-reported professional development activities. Teachers described development activities independently from other development activities. The possible connections between activities undertaken, or so-called activity chains (Leeferink et al., 2019), were not part of this study. Further research could study long-term learning processes including all development activities and their interrelations. Finally, why teachers learned and detailed information on what teachers learned, was not included in this study. Future research could address these issues.

Practical implications

Following from the results, we suggest that both formal and informal activities should be supported by school management and policymakers. This study can create more awareness, specifically about informal professional development. The typology used in this study can function as a tool to reflect on policy for CPD and its implementation. We suggest that schools foster informal professional development by encouraging and calling on teachers to work, teach, experiment, and innovate together with significant others as much as possible. Our findings underline the importance of customising the form, as

well as the contents of CPD. The learner report used in this study can be used as a tool to stimulate dialogue in teacher teams about CPD and might help to gain more insight into individual CPD.

Conclusion

As our study has shown, vocational teachers learn through a wide range of both informal and formal professional development activities. In line with our situated perspective on professional development and specified for Dutch school-based vocational education, we can conclude that these activities are rooted in and encouraged by the dynamics of the workplace of vocational teachers and differ per teacher. As we continue to expand our understanding how to stimulate vocational teachers' professional development, a next step in research is to examine how informal and formal learning can be encouraged and facilitated in order to utilise its full potential. The results of the present study indicate which activities within the work environment would be beneficial to a learning process specifically for the context of vocational education.



3

**Vocational teachers' continuing
professional development:
Activities, learning outcomes and factors**

ABSTRACT

Vocational teachers are expected to keep their professional knowledge and skills up to date. In order to support their professional development effectively, we need to understand how vocational teachers learn, what they learn, and why they learn. This study characterises vocational teachers' continuing professional development. Teachers' perceptions of their professional development were gathered during a two-and-a-half-year longitudinal study. Through learner reports and semi-structured interviews, 12 experienced teachers described their learning activities, their realised professional development over time, and the factors that contributed to their professional growth. Within the gathered data, three different professional development profiles were identified: professional development (1) focusing on the primary process of teaching students, (2) focusing on executing tasks and roles in school, and (3) focusing on oneself in relation to the wider context of vocational education. These profiles contribute to organising customised support of professional development trajectories.

Keywords

Continuing professional development; learning activities; vocational education and training; vocational teachers; learner report

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INTRODUCTION

Vocational teachers, like other teachers, are expected to keep their professional competence up to date to provide students with high-quality education (Zhou et al., 2023). In many countries, like in Australia, Sweden, Germany, and the Netherlands, vocational teachers are often second career teachers, who previously worked in the vocational practice they prepare students for. They are expected to be knowledgeable about this vocational practice, as well as the principles and practices of effective teaching (Andersson & Köpsén, 2018). Therefore, dual professionalism is an essential characteristic of vocational teachers' competence (Bükki & Fehérvári, 2024).

To address the demands of professional duality, it is necessary for vocational teachers to learn in their day-to-day activities (De Bruijn, 2012), and thus, to continuously develop professionally (Andersson & Köpsén, 2018). Continuing professional development (CPD) refers to the ongoing process of learning and growth of professionals. CPD is stimulated in and by teachers' daily practice in which they undertake various informal and formal learning activities (Andersson et al., 2018).

Studies on CPD of vocational teachers often focus on the development of beginning teachers (Gagnon & Dubeau, 2023) and teacher teams (Bouwman et al., 2017) or on the effects of a specific intervention, setting, or innovation, for example a professional development programme (Wildeman et al., 2022). These studies show that professional development of vocational teachers is embedded in the social practice of their school, and occurs in interaction with actors outside school boundaries such as vocational practice (Andersson & Köpsén, 2018).

Although current studies illustrate the value of CPD of teachers in general, little is known about CPD of vocational teachers. This article focuses on characterising the CPD of vocational teachers that teach vocational subjects in the Netherlands. CPD is characterised in terms of coherence in the activities vocational teachers engage in, perceived changes in their thinking and acting, content of these changes, and factors teachers believe to have contributed to their CPD. In this longitudinal study, we followed 12 experienced vocational teachers in their professional development for two-and-a-half years, resulting in a better understanding of their CPD.

THEORETICAL BACKGROUND

We approach continuous development of teachers from a situated perspective on learning (Evans, 2019). CPD is considered a practice that is inherently social, relational, and embedded in daily practice at the workplace (Billett et al., 2018). Vocational teachers are part of a community related to their teaching practice, as well as to the specific vocational practice they are teaching about. They learn through participating in interaction with others in both communities, and therefore, this learning can be considered a complex and dynamic process, involving activities that lead to changes.

Continuing professional development

Professional development of teachers is defined as a continuous process throughout teachers' careers (Pedder & Opfer, 2013). Continuing professional development (CPD) is situated and anchored in the daily practice of teachers and is characterised by engagement in both individual and collective activities that elicit learning (Sancar et al., 2021). CPD is not solely connected to teaching or classroom situations, but embedded in the full range and contexts of vocational teachers' work. Individual and collective activities are opportunities for teachers' CPD and serve as catalyst for changing teachers' (practical) knowledge, beliefs, actions, and practice in a broad spectrum of learning outcomes being cognitive, affective, and practical in nature (Eraut, 2007).

In this article, we investigate CPD in terms of changes in teachers' knowledge, beliefs, and practice. We use the word changes in a neutral way (Bakkenes et al., 2010), not necessarily referring to an improvement of thinking or acting. Changes are a result of a continuous process of (learning) activities. Within this process teachers' thinking and acting transforms, which can lead to new (learning) activities (Clarke & Hollingsworth, 2002). Changes in knowledge, beliefs, and practice are not always linear (Guskey, 2002). This means for example, that changes in teachers' beliefs can lead to changes in actions and vice versa (Merchie et al., 2018). More specifically, teachers' knowledge, beliefs, and emotions guide their actions in practice, and likewise, teachers' practical experiences affect their knowledge and beliefs (Wildeman et al., 2022). Therefore, all aspects of changes should be taken into account and studied in order to understand teachers' professional development.

Based on Bakkenes et al. (2010) and inspired by the research on workplace learning (Eraut, 2007), we characterise professional development by four categories of changes. The described changes are supplemented with examples of the *content* of these changes.

- *Changes in knowledge and beliefs:* changes in conceptual and practical insights, beliefs, ideas, and awareness. For example, changes in knowledge about student characteristics.

- *Changes in emotions*: changes in positive or negative feelings, attitudes, or indications of unexpected revelations. For example, changes in emotions concerning cooperating in a teacher team.
- *Changes in intentions for practice*: changes in ambitions or goals. For example, changes in intentions for practice related to online teaching methods.
- *Changes in practice*: changes in actions and teachers' practices. For example, changes in actions concerning guiding students during lessons.

Formal and informal activities that stimulate learning

Teachers develop themselves professionally in many situations by undertaking both formal and informal activities (Ballangrud & Nilsen, 2021). These activities are elicited by teachers themselves, by events and actors in the teachers' environment (Hoekstra et al., 2018). Formal and informal activities should be seen as equally important for professional development (Spaan et al., 2016).

Formal opportunities for professional development are usually described as pre-designed activities which may encourage teachers' learning. These activities are organised and planned in terms of time, space, goals, and support (Kyndt et al., 2016). For vocational teachers such activities include, for example, a training on coaching students or a conference about vocational education (Akiba & Liang, 2016). Formal activities may also provide teachers with opportunities to undertake a variety of informal activities in their everyday workplace context (Spaan et al., 2016). Professional development provoked by informal activities arises naturally as part of daily work situations, occurs spontaneously, and is not easily recognised as learning per se. Examples of informal activities include learning from teaching, learning from interaction with colleagues, or learning from extracurricular activities (Hoekstra et al., 2009). Informal activities can be both non-intentional and intentional, for example when teachers purposefully attempt to solve a problem or experience a challenge (Kyndt et al., 2018).

Contributing factors to professional development

Although research on contributing factors of professional development in the context of vocational education is limited, prior research in other sectors operationalised key features, factors, conditions, or characteristics of activities that facilitate teachers' professional development (Merchie et al., 2018; Van den Bergh et al., 2014). In these studies, eight main factors can be identified (Kyndt et al., 2018; Van den Bergh et al., 2014) (Table 3.1). The first six factors are derived from literature on professional development provoked by formal activities for teachers (Van den Bergh et al., 2014; Van Veen et al., 2012). Similar factors can be found in literature on professional development because of informal activities. The seventh and eighth factor are derived from research about how informal teacher learning can be supported, encouraged, and developed (De Jong et al., 2022; Kyndt et al., 2018).

Table 3.1. Factors contributing to professional development.

	Factor	Description
1	Active participation	The activity should encourage active involvement of teachers.
2	Intensiveness and duration	The activity should be of some duration and sustained for a longer period.
3	Clear purpose	The activity should have a clear purpose for learning and teachers should recognise the relevance of this purpose.
4	Alignment with and building on teachers' own practices, knowledge, and beliefs	The activity should be related to specific problems or day-to-day practice in school. The activity should address teachers' own practices, knowledge, and beliefs.
5	Reflection	The activity should encourage reflection on teachers' own practice, knowledge, and beliefs.
6	Collective participation	The activity should incorporate collective participation and interacting with others.
7	Personal characteristics	Personal characteristics, such as having a personal interest in or feeling about the content, can encourage the engagement of teachers in activities that provoke learning.
8	Work or job environment characteristics	Work or job environment characteristics, such as location or school structure, can enhance teacher learning.

RESEARCH QUESTION

In line with the previous section, we frame CPD as a continuous process, embedded in teachers' work, in which (learning) activities may lead to changes in knowledge, beliefs, and practice. We focus on three interrelated key aspects of CPD as displayed in Figure 3.1: activities that elicit learning, changes in thinking and acting, and contributing factors (cf. Sancar et al., 2021). With this framework, we aim to understand the CPD of vocational teachers. The research question is: *What are the characteristics of the CPD of vocational teachers in terms of activities that elicit learning, perceived changes in thinking and acting, content of these changes and contributing factors?*

METHOD

Following our situated perspective on CPD as an ongoing process, a longitudinal, qualitative research design was implemented. In line with prior research on teacher professional development, we studied CPD by accessing vocational teachers' perceptions about their own learning (e.g. Zhou et al., 2023) in terms of activities, perceived changes in thinking and acting, and contributing factors (Figure 3.1). Therefore, the design involves both learner reports and semi-structured interviews.

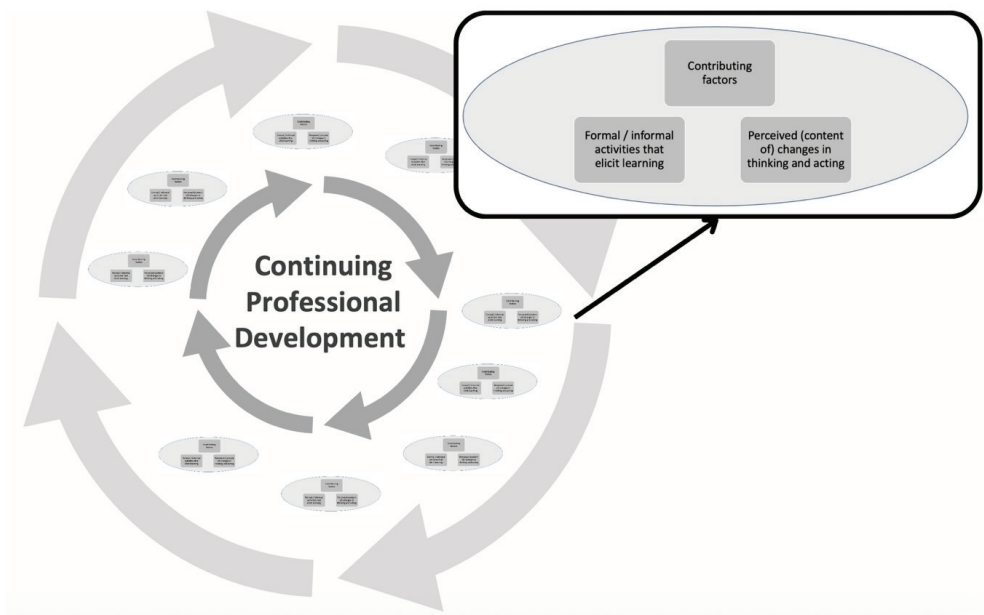


Figure 3.1. Conceptual framework of CPD.

Context and participants

This study was conducted in Dutch Senior Secondary Vocational Education at level 2–4 of the European Qualification framework (EQF), in this article further referred to as vocational education. In the Netherlands, vocational education is a substantial part of the public educational system, wherein students prepare for vocational practice (De Bruijn et al., 2017). Vocational teachers who teach vocational subjects, for example baby care skills or accountancy, can be described as a heterogeneous group with respect to their background, ways of preparing for teaching practice, and expertise (Van der Klink & Streumer, 2017). For the majority of vocational teachers, teaching is a second career. Typical Dutch vocational teachers have experience both in the occupational field they prepare students for, and from teaching.

To transcend the specificity of one occupational field, participants were recruited in two contrasting domains: the domain of business and the domain of welfare. Participants were recruited through purposive sampling (Cohen et al., 2011). Experienced Dutch vocational teachers who teach vocational subjects were approached to participate via an information letter, disseminated through the first author's network and through social media posts. Selection criteria were teaching experience (>5 years Berliner, 1994), contract size (>3 days per week), and scheduled contact hours with students (>8 h per week). This resulted in 33 teachers from five different vocational schools (45% business and 55% welfare).

Due to time constraints, illness, and early retirement nine participants opted out during the first year. Of the 24 participants who completed the study, 12 participants met the final criterion of explicating ten activities in the semi-structured interviews (see Instruments section). These 12 participants, from four different vocational schools, were included in the analyses (Table 3.2). All participants joined voluntarily and signed an informed consent form that was reviewed by the ethics committee of the HU University of Applied Sciences Utrecht (project no. 2019-01). Participants are referred to by a pseudonym. We were attentive to the possibility of selection effects by inspecting data from participants that did not meet the inclusion criteria. We found no indication of substantial differences between the groups.

Instruments

Learner reports

Online learner reports (Van Kesteren, 1993) were used to gather in-depth descriptions of activities that encouraged teachers to learn and their perceived short-term changes in knowledge, beliefs, and practices as a result of participating in the described activity. The learner report was developed based on Meirink, et al. (2007) and thoroughly piloted to enhance validity and reliability (Appendix D). This pilot phase resulted in a learner report which consisted of a guideline (Appendix E) with mainly open questions that simulate rich descriptions and collect a broad spectrum of activities.

Table 3.2. Demographic information about the participants.

Institute	Alias	Gender	Teaching domain	Teaching experience (years)	Age
School 1	Ben	Male	Welfare	15	59
School 1	Kameron	Male	Business	7	55
School 1	Kay	Male	Bussines	11	57
School 2	Donna	Female	Welfare	9	33
School 2	Elizabeth	Female	Welfare	15	38
School 2	Maryam	Female	Welfare	18	56
School 2	Matthew	Male	Business	16	54
School 2	Uma	Female	Business	5	51
School 3	Olivia	Female	Welfare	18	54
School 3	Nathan	Male	Business	6	29
School 3	Shanon	Female	Business	8	43
School 4	Katie	Female	Welfare	12	41
				Average: 12	Average: 48

In-depth semi-structured interviews

To gain more in-depth information about the perceived long-term professional development of the teachers due to their activities, a semi-structured interview was conducted on perceived changes in knowledge, beliefs, and practices, and factors contributing to these changes. The interview guide was based on the work of Meirink et al. (2007). A pilot study, in which two teachers participated, and calibration sessions with the research team resulted in a final interview guide (Appendix F).

Procedure

To match the longitudinal nature of this study, two data collection periods were set up during two-and-a-half years (2018–2020) (Table 3.3). At the beginning of the first data collection period, participants were given a paper logbook and were encouraged to log and reflect on meaningful activities related to CPD, in order to facilitate their memory for filling the learner reports. In each period, participants were asked to complete three digital learner reports spread over a school year. After each learning report was completed, two researchers (the first author and an independent researcher) evaluated the richness of the data. When a teacher provided limited information, the researcher gathered missing information by phone. Next, at the end of each of the two data gathering periods participants were interviewed for one hour by phone about their perceived long-term changes and the contributing factors. Participants themselves selected five meaningful situations that contributed most to their professional development for this interview. The interviews were recorded and transcribed verbatim.

Data analysis

Data were analysed in a qualitative manner using four steps (Figure 3.2) (Miles & Huberman, 1994). Firstly, datasets were made from the data of each of the 12 participants. As participants reported on a maximum of ten relevant activities in the interviews, ten datasets per participant were made (i.e. 120 datasets; ten per teacher). Each dataset contained a learner report and interview data on one activity. Each dataset was thoroughly read by the first author. Secondly, fragments were coded while simultaneously developing a coding template based on concepts described in the Theoretical Background. To align the template to the context of vocational education, adjustments were made to the template during the coding process (see Table 3.4 for final coding template). All answers to learner report questions or interview questions were considered as fragments; fragments could be assigned multiple codes. The 120 datasets were coded for 'type of activity' by the first author in a previous study (see **Chapter 2**). For the current study, if relevant, each fragment was also assigned codes for 'perceived changes' and 'contributing factor' by the first author. Seventeen percent of the coded fragments – corresponding to the complete dataset of two participants – was independently coded by the first author and an independent researcher (see Acknowledgement). In total, the first author and the independent researcher both assigned 359 codes. Differences (143 codes) were discussed between the

first author and the independent researcher until agreement was reached. For 13 codes no agreement was found; these fragments were discussed in the entire research team until consensus was reached. The coding of the content of the perceived changes was inductive in nature. That is, all fragments that were coded as ‘changes’ were also assigned a ‘topic’ code. Examples of topics were discussed within the research team. Next, topics were clustered to represent the content of perceived changes.

Table 3.3. Overview of the data collection process.

Data collection period 1			
October 2018	February 2019	May 2019	July – September 2019
LearnerReport 1 →	LearnerReport 2 →	LearnerReport 3 →	Semi-structured interview 1
Data collection period 2			
November 2019	February 2020	October 2020	November 2020 – March 2021
LearnerReport 4 →	LearnerReport 5 →	LearnerReport 6 →	Semi-structured interview 2

Thirdly, for each teacher a matrix was created in which the teacher’s data was displayed. Assigned codes were provided with a colour, resulting in a colour-coded matrix per teacher (Appendix G). These matrices included (a) activities that elicit learning, (b) perceived changes, (c) content of the perceived changes, and (d) contributing factors. Next, to create an overview, notable elements within each colour-codes matrix were highlighted by the first and second author and discussed with all three authors. This resulted in a summarised ‘overview’ colour-coded matrix of all 12 teachers, in which the most distinctive differences between teachers per variable were visualised (Appendix H).

Fourthly, in line with assumptions underlying quantitative cluster analyses (Norusis, 2010), we looked for clusters of CPD of vocational teachers that fitted to our qualitative data. We applied three criteria to decide upon the most appropriate cluster solution: (a) differences between clusters should be as large as possible and the differences within a cluster as small as possible, (b) there had to be more than one teacher in each cluster, and (c) the clusters had to be interpretable, that is, colour-coded matrices in a cluster should together form a meaningful group (Thurlings et al., 2019). To select the most distinctive and interpretable cluster solution, teachers were grouped by the first and second author, using each of the four variables (activities, perceived changes, content, and contributing factors) as a starting point. Each starting point-variable was studied and discussed in coherence to all other variables. Sorting teachers on the variable of ‘activity’ turned out to result in the most distinctive and best interpretable cluster solution; criterion b was also met and therefore this cluster solution was chosen. Next, the cluster solution was discussed with the third author. We further describe our cluster solution as profiles in the Results section.

Table 3.4. Final Coding Template.

<i>Activities that elicit professional development</i>	<i>Perceived changes</i>	<i>Contributing factors</i>	<i>Content of perceived changes</i>
Informal activities	1. Changes in knowledge and beliefs	• Active participation	• Teaching and coaching students
1. The primary process of teaching and coaching students	• Awareness	• Intensive	• Working in a teacher team/school
	• Confirmed ideas	• Collective participation	• Personal and career development
2. Interaction, discussion, collaboration and sharing with others	• New ideas	• Clear purpose	• Vocational practice
	2. Changes in emotions	• Aligns with and builds on teachers' own practice, knowledge, and beliefs	• Designing education
	• Positive emotions	• Reflection	• Digitalisation and digital skills
3. Engaging in tasks, roles, and extra-curricular activities	• Negative emotions	• Personal characteristics	• Time-management and workload
	• Surprise	• Work or job environment characteristics	• Vision on education and teaching
4. Consulting (offline/online) information sources	3. Changes in intentions for practice		• Assessing learning
	• Intentions for practice		• Organisation in and outside school
5. Experimenting and innovating	• Intention to continue current (OLD) practice		• Laws and regulations of vocational education
	4. Changes in practice		• Research skills
6. Reflection and evaluation	• New practice		• International perspectives
	• Back to old practice		
Formal activities			
1. Professional development programs			
2. Courses for a degree or credits			
3. Receiving structural coaching			
4. Attending a professional conference			
5. Participating in formal teacher collaboration			

RESULTS

Analyses revealed three profiles that characterise the CPD of vocational teachers. The most prevalent distinction between the profiles was found for the aspect 'activities'. The content of the perceived changes bolstered differences between the profiles, and contributing factors and perceived changes illustrated these differences in more detail. Table 3.5 shows an overview of the profiles and lists the characteristics of the aspect per profile. Next, the profiles are described and illustrated with quotes.

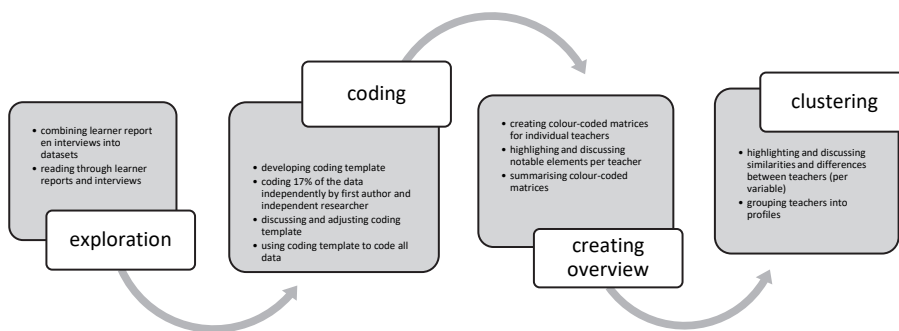


Figure 3.2. Data analysis process.

Profile 1

Profile 1 applies to five vocational teachers: Ben, Elizabeth, Maryam, Kameron, and Matthew. They mostly mentioned informal activities as meaningful activities that elicit their learning. All teachers in this profile mentioned that they learn from both teaching and coaching students. Matthew described, for example:

In the current first year, different levels of educational programs of Retail are combined. ... This combination meant that I had to offer lessons and student guidance in a differentiated manner. ... Now, I attune my teaching activities better to the level of the student. I study the level of a student before I use a specific teaching method or guidance approach with them.

In addition, teachers in profile 1 learned from interacting, collaborating, and sharing information with colleagues, students, and stakeholders from vocational practice, and by experimenting and innovating. For example, they explained that they learned from re-designing parts of the educational programmes and innovating (online) lessons or assessments.

As a result of their undertaken activities, profile 1 teachers described changes in all domains, although teachers in this cluster marked more changes in awareness and emotions, and fewer changes in intentions for practice, compared to teachers in the other profiles. Regarding changes in emotions, Kameron said:

Together with the student and her supervisor we discussed how to formulate a good problem definition. ... Supervising a graduation thesis is a new experience for me. This gives me a good feeling and makes me feel more competent.

The content of the perceived changes is mostly related to three aspects in teachers' work: designing educational programmes, teaching lessons, and working in a teacher team.

For example, Elizabeth elaborated on her changed beliefs about collaborating with her colleagues through trying out online teaching methods: 'We experimented together with online teaching methods. It is my wish to continue this process. So I really appreciate doing these kinds of things [experimenting] together. I noticed that co-teaching elicits professional development of me and my colleagues.'

Ben, Elizabeth, Maryam, Kameron and Matthew often mention that interaction with others, active participation, and alignment with their own practice and beliefs are factors that contribute to their learning. For example, Matthew described:

I learned from the implementation of working 'agile' in our educational program and in our teacher team. ... I learned because this concept and instrument [of working 'agile'] matches my beliefs about how to deal with changes visible in society around us and in companies. It fits the way to stay up-to-date and I like that because it [the benefits of working 'agile'] also becomes visible to my students.

Colleagues in their teacher team and students are the predominant significant others contributing to their CPD. Personal factors, such as experiencing a positive feeling, for example 'wanting to be helpful to someone else', or experiencing friction, contribute to teachers' learning too.

Profile 2

Olivia, Shanon, and Donna are the teachers in profile 2. They mostly learn through informal activities. These informal activities concern interacting and collaborating with colleagues, policy advisors, and school leaders, and reflecting and evaluating on lessons, tasks, or collaborations. Olivia, for example, described that 'evaluating the process of the accreditation of our school to become a formal training school for student-teachers' elicits her learning. Additionally, teachers in profile 2 mention that they learn from undertaking tasks and roles in their teacher team and during cross-team activities, such as supervising student-teachers or coordinating student internships in vocational practice. Shanon described:

I coordinate all student-teacher trajectories in our school. I had an introductory meeting with our CEO [name]. ... This situation makes me believe that I have more to offer and that I have gained confidence in my new task. I now know that I'm able to discuss issues with management, while I thought I would not function well at that level.

Teachers in profile 2 described perceived changes in all four domains, although compared to the other two profiles their activities lead to fewer changes in practice or intentions for practice. Their perceived changes in emotions were mostly positive. Donna, for example,

Table 3.5. Profiles of vocational teachers' CPD.

	Profile 1			Profile 2			Profile 3					
	1	2	3	4	5	6	7	8	9	10	11	12
Teachers	Matthew	Kameron	Elizabeth	Ben	Maryam	Donna	Olivia	Shanon	Uma	Nathan	Katie	Kay
Activities			Informal				Informal			Formal and informal		
Type of activities		Teaching and coaching	Experimenting and innovating	Interaction			Interaction			Programs	Courses	Reflection
Perceived changes			Knowledge and beliefs	Emotions	Intention for practice	Practice	Knowledge and beliefs	Emotions	Intention for practice	Practice	Tasks and roles	Knowledge and beliefs
Content of perceived changes		Teaching and coaching students	Designing education	Working in a teacher team/school			Teaching and coaching students	Working in a teacher team/school	Personal and career development			Teaching and coaching students
Contributing factors		Collective participation	Active participation	Allignment with practice	Personal factors		Collective participation	Allignment with practice	Personal factors			Working in a teacher team/school
												Personal and career development
												Vision on education and teaching
												Vocational practice
												Collective participation
												Active participation
												Reflection
												Personal factors

mentioned that: 'A discussion with my team leader about my new ideas to improve discussions in our teacher teams about students' educational progress gave me new energy to invest in the quality of our education.'

The content of their perceived changes is mostly about teaching and coaching students and about cooperating in a team or the wider school organisation. Shanon described, for example:

I'm the leader of group responsible for re-designing our curriculum. ... I want to design via a more research-based process, but there is no time for that and I learned that my colleagues have a different view on this.

In addition, the changes the teachers in this profile perceive concern their personal and career development, such as gaining more self-confidence or taking on a new task. Donna described, for example: 'I received feedback from students about my teaching. This feedback made me think about my career development and possibly further training. I want to discover that'

Important factors that contribute to profile 2 teachers' learning are collective participation and alignment with their own knowledge, beliefs, and practices. For example, Olivia said that she learned from observing student-teachers in class because 'this method of guidance fits my view on what good guidance for a student-teachers should entail'. Personal factors also contributed to the learning of teachers in this profile, in particular having a personal interest or feeling an emotional connection to the content of an activity. Donna explained: 'I learned from discussing about pedagogy and raising children with my friends. This connects to what I also consider an important subject'.

Profile 3

The teachers in profile 3, Kay, Nathan, Katie and Uma, noted both formal and informal activities as meaningful for their professional development. They described formal activities such as engaging in programmes, trainings, and courses for a master's degree. For example, Katie described she learned from her master's degree course, by reading articles about teaching or conducting and sharing research in the school. Teachers in profile 3 describe that the informal activities reflecting and evaluating, and executing tasks and roles, elicit their learning. The formal and informal activities profile 3 teachers described, take place in their own teacher teams, with others in the wider organisation of their school, and outside their own school.

Kay, Nathan, Katie and Uma described changes in all domains. Compared to the teachers in the other clusters, they described a confirmation of their knowledge and beliefs more often. Kay stated for example:

I organised a meeting for my colleagues. The meeting was about the new educational model. ... This meeting confirmed my idea that the process of implementing a new model should have follow-up, needs constant attention, and demands involvement of others.

Similar to profile 2 teachers, the content of the perceived changes Kay, Nathan, Katie and Uma reported are about teaching and coaching students, their personal and career development, and about working together in a teacher team, such as learning to cope with work pressure or investigating their career prospects. The content of the perceived changes reported by the teachers in profile 3 also concerns their personal views on vocational education and developments in vocational practice. Katie described, for example:

The management of our school asked me to write a research and inspiration report on blended teaching. ... Through writing this report I learned more about blended learning. This process has made me look at our educational system from a different point of view.

Profile 3 teachers describe that collective and active participation are factors that contribute to their learning. Additionally, interacting, studying, and designing together with their colleagues, experts, and trainers, is important as is reflection. To illustrate, Uma described: 'My continuing search for inspiring online teaching materials stimulated me to reflect on my negative feelings towards online education'.

Personal factors, in particular emotional connection with the activity, were also perceived relevant for teachers' learning in profile 3. This emotional connection is both positive and negative in nature. For example, teachers described that they learned because they 'are enjoying working together with experts' or they 'are negative about the subject'.

DISCUSSION AND CONCLUSION

This study aimed to gain a better understanding of the CPD of vocational teachers, using a conceptual framework based on a situated perspective of learning as continuous process throughout teachers' careers (Figure 3.1). The research question was: *What are the characteristics of the CPD of vocational teachers in terms of activities that elicit learning, perceived changes in thinking and acting, content of these changes and contributing factors?* Our results show that teachers undertake a diverse range of activities that elicit their professional development, both as part of their daily work and beyond. The longitudinal and qualitative research design enabled us to identify three profiles that characterise the CPD of vocational teachers. Although teachers' CPD within a profile is not completely alike, we found that the dominant distinction *between* the profiles was on the aspect 'activity'. Fur-

thermore, large differences between profiles were visible in the content of the perceived changes. Teachers appear to differ in *how* they value and prioritise their relevant activities and *what* they learn, and consequently how they want to contribute to their practice of vocational education (Van der Heijden et al., 2015).

Profile 1 vocational teachers are strongly *focused on the primary process of teaching and coaching students*. These teachers develop themselves through informal activities strongly related to processes of experimenting, teaching, and coaching, in interaction with students and colleagues. In line with Köpsén (2014), profile 1 teachers thus learn in close relation to their students' learning and to their teacher team (Bouwman et al., 2017). Their perceived changes in knowledge, beliefs, and practices refer to their design, pedagogical and collaboration competencies (Köpsén & Andersson, 2017). Profile 2 teachers are more *focused on executing tasks and roles in school*. These teachers learn through informal activities strongly related to cooperating, reflecting, and undertaking tasks and roles in their school in interaction with others inside and outside their own teacher team. In line with Bouwman et al. (2017), the responsibility for tasks and roles in teacher teams is positively associated with their learning. Profile 3 is *focused on oneself in relation to the wider context of vocational education*. Teachers in this profile develop through formal and informal activities in interaction with others outside their teacher team, such as experts, and frame this as most efficient for their learning (see also Spaan et al., 2016). In line with the nature of working in vocational education, profile 3 teachers participate in multiple communities outside their own team, for example, in professional learning communities together with vocational practice (Ballangrud & Nilsen, 2021). Furthermore, consistent with Karlberg and Bezzina (2022), profile 3 teachers frequently participate in organised courses, for example attending a master's degree programme. The perceived changes of these teachers mostly relate to their career development and changing views on (teaching in) vocational education in general.

Our results show that there are similarities and differences between vocational teachers and their CPD (see Table 3.5). Vocational teachers in all three profiles report changes in their knowledge, beliefs, emotions, and (intentions for) practice because of their undertaken professional development activities. In line with literature, collective participation and personal factors as feelings, challenges and interests are contributing factors for all teachers' learning (Van den Bergh et al., 2014). In addition, our results illustrate that all teachers report, to some degree, changes related to teaching and coaching students, although significant variations were noticeable between, on the one hand, profile 1, and on the other hand, profile 2 and 3. That is, teachers in profile 1 described significantly more changes on this subject.

Regarding the differences, the three profiles seem to reflect diverse dominant professional orientations teachers may have towards their work – and therefore, towards their

CPD – in the specific context of vocational education (Köpsén & Andersson, 2017). The characteristics of the three profiles reflect their personal professional agenda in relation to their daily work and how they want to affect their students' learning (Bükki & Fehérvári, 2024). These orientations are not limited to learning related to classroom-centred activities mostly described in literature on CPD of teachers in primary and secondary education (e.g. Hubers et al., 2022). CPD of *vocational* teachers includes continuously shaping and designing educational programmes and materials within teacher teams, applying distributed leadership by executing roles and tasks in schools, and maintaining relations with significant others outside school. Vocational teachers' CPD seems focused on both the primary process of teaching and the tactical and strategic level in (large) organisations, such as forming a vision on education or implementing large educational innovations. Specifically, profile 3 teachers distinguish themselves from other profiles by also focusing on their career development. This career-oriented focus can partly be explained by the enrolment of some of these teachers in a master's degree programme.

Our findings show that the CPD practices and challenges of vocational teachers reflect the broadness of what is necessary to function in vocational education. We argue that in teams, a combination of all three orientations (profiles) is beneficial for current and future efforts to enhance school performance (Ommering & Koeslag-Kreunen, 2023). More specifically, teacher teams should pay attention to the professional orientations of their teachers to align to and benefit from both individual and collective learning (Ballangrud & Nilsen, 2021). Embracing diversity in teachers' orientations for CPD ensures that schools can adapt to changing education and industry needs, while keeping teachers motivated and engaged in their professional roles.

Noticeably, in all profiles we found fewer mentions of interactions with vocational practice than expected. However, previous research has established vocational practice as a significant actor and topic in vocational teachers' learning (Bükki & Fehérvári 2024; **Chapter 2**). We believe that activities related to interaction with vocational practice may have become underexposed due to the design of our study, in which teachers themselves selected the most meaningful activities that elicited their learning. This result suggests that learning with and about vocational practice is not consistently prioritised by vocational teachers when describing their learning.

Limitations and suggestions for further research

Our study has some limitations. Firstly, we conducted longitudinal and in-depth research on CPD in which we relied on self-reports. The extensive and rich responses in both learner reports and interviews indicate that participants were indeed able to remember learning experiences in detail. Although using self-reported data is generally used in research on teachers' CPD (e.g. De Jong et al., 2022; Zhou et al., 2023), our results do not reveal visible changes in teachers' practices (Van den Bergh et al., 2014). Further research

could focus on the implications of CPD for teachers' practices and their students' learning through observations or assessment of perceived changes in the learning of vocational students. Secondly, our study shows that a meaningful activity that elicits learning can be a useful starting point for research on teachers' CPD. However, our theoretical lens also implies that learning is a continuous process, and therefore, activities often do not stand alone and may be part of chains of activities (Leeferink et al., 2015). A follow-up study could focus on characteristics of such chains. Thirdly, our study included a limited number of experienced vocational teachers who teach a vocational subject in the domain of business and welfare. In future research, teachers from other domains and novice teachers could be included. Finally, we have chosen an intensive longitudinal research design that allowed us to reach a deep understanding of vocational teachers' CPD and that enabled us to identify CPD profiles of teachers. This resulted in a long data collection period, and the final data collection (October 2020) took place during the COVID-19 pandemic, which may have influenced our results. Further scrutinisation of the data revealed that, during this period, teachers selected only a few professional development activities that were specifically related to the pandemic, for example designing online lessons and online-teaching, thus resulting in balance in the datasets.

Practical implications

Several practical implications for vocational teaching practice can be derived from our study. Firstly, the profiles presented in this study provide a framework to interpret teachers' CPD in terms of how and what teachers (want to) learn. The results imply that school leaders and teacher teams should recognise and support conditions that facilitate teachers' involvement in activities other than teaching as an important element for CPD. Preferably, CPD is connected to different career paths that reflect the three professional orientations visible in the profiles. For example, by promoting roles and tasks within schools and supporting learning initiatives outside schools. Our results might be used to stimulate a continuous dialogue about CPD. Secondly, our study shows that learning from and about the vocational practice needs more attention and is not prioritised in experienced teachers' CPD. To continuously provide up to date vocational education for students (Smith & Yasukawa, 2017), schools should prioritise, value, and support CPD related to both teaching and vocational expertise. For example, by stimulating boundary crossing activities. Finally, like previous studies (e.g. Gairín Sallán et al., 2022; see also **Chapter 2**), this study highlights the importance of both formal and informal activities that elicit learning. We suggest that schools offer a blend of formal and informal activities to foster informal learning, for example through facilitating professional learning communities, lesson study, or teacher work groups (Admiraal et al., 2021).

Conclusion

Our findings depict vocational teachers' CPD. Like their students, teachers do not all learn in the same way. With our research design we were able to identify and describe

patterns in teachers' CPD. Vocational teachers' CPD is strongly related to the professional orientations teachers have towards their day-to-day work connected to teaching and coaching students, to executing a wide range of tasks and roles in schools, or to the wider context of vocational education. In our view, these orientations reflect the heterogeneity of vocational teachers' background and expertise, and the variety in the teachers' work in vocational education (Van der Klink & Streumer, 2017). Furthermore, our study shows that vocational teachers create learning opportunities themselves, which vary in terms of how and what they learn (e.g. Kyndt et al., 2018; Zhou et al., 2023). Our research enriches the existing insights of CPD in general, that is, to the full extent of the teaching profession and making use of a framework for research on CPD. Insight into vocational teachers' CPD might be a way to facilitate CPD accordingly and to purposefully co-design CPD with teachers, rather than attempt to create standardise professional development programmes.



4

Characterising vocational teachers' knowledge: Nature and content

ABSTRACT

To provide high-quality education, teachers in vocational education are expected to keep their knowledge up to date. Vocational teachers' knowledge includes both teaching knowledge and knowledge about the vocational practice teachers educate their students for. Research on teachers' knowledge predominantly focuses on classroom practices in the context of primary and secondary education. There is significantly less research on vocational teachers' knowledge and to the full extent of their teaching vocation within and beyond classroom practices. A study with repeated measures was conducted to explore what characterises vocational teachers' knowledge. Over three years, 22 experienced vocational teachers annually constructed concept maps to articulate their knowledge. The content and nature of these concept maps were analysed using a framework developed in previous research. Results show that the nature of vocational teachers' knowledge can be characterised as concrete, specific, and complex. The content of vocational teachers' knowledge comprises knowledge about the process of teaching and coaching students, students' vocational practice, organisational knowledge both inside and outside school boundaries, and knowledge about navigating between stakeholders and contexts. These results may inform professional development programmes and teacher education and stimulate an ongoing dialogue on professional standards in vocational education.

Keywords

Professional development; teacher knowledge; vocational education and training; experienced teachers; concept mapping

This chapter is based on:

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INTRODUCTION

Vocational teachers play a pivotal role in ensuring the quality of vocational education (Bükki & Fehérvári, 2024). Teaching in vocational education occurs at the intersection of education and vocational practice. This requires teachers' ongoing adaptation to changes in vocational practice, evolving educational views, and increasing student diversity. This dynamic and multifaceted nature of teaching in vocational education demands that vocational teachers continuously update their knowledge (Andersson & Köpsén, 2018; Smith & Yasukawa, 2017).

Teacher knowledge includes formal, practical, and work-process knowledge (Malva et al., 2023; Meijer et al., 1999), such as knowledge about methods, symbols, and language and explicit and tacit values, beliefs, and traditions used in both teaching and contemporary vocational practice (Andersson & Köpsén, 2018). Research on vocational teachers' knowledge is relatively scarce and fragmented (e.g. Rahmawati et al., 2021; Wildeman et al., 2023). Most existing research on teacher knowledge has been conducted in primary and secondary education (e.g. Liu & Phelps, 2020; Malva et al., 2023) and focuses on the knowledge teachers use in classroom situations such as subject matter knowledge, pedagogical content knowledge, and pedagogical knowledge (Anderson & Taner, 2023; Shulman, 1987). These studies fail to capture some of the distinctive features of teaching in vocational education, and the full extent of the teaching vocation which is characterised by the need for a firm connection with vocational practices and the responsibility for the curriculum and student learning as a team. Vocational teachers' knowledge should therefore be studied using a broad lens that includes all aspects of the content and nature of teaching in vocational education.

This study aims to characterise experienced vocational teachers' knowledge in the context of Dutch vocational education. We employed concept mapping to capture vocational teachers' self-reported knowledge about their vocation using repeated measures over three years.

THEORETICAL BACKGROUND

The concept of teacher knowledge has been widely researched using different perspectives. In this study we follow a sociocultural perspective, viewing teacher knowledge as an intrinsic part of their daily practice that is continuously developed through interaction with others and that is embedded in the contexts where teaching occurs (Billett et al., 2018). Knowledge develops from participating in the work practice, for example through performing routines, solving problems, and making informed judgements (Guile & Unwin, 2022; Heusdens et al., 2018), and directs teachers' actions (Meijer et al., 1999; Schaap et al., 2011).

Teacher knowledge is a personal synthesis of different types of knowledge, such as formal knowledge, shared professional knowledge that reflects both teaching and the (current) vocational field teachers educate students for, and tacit knowledge (Guile & Unwin, 2022; Schön, 1992). These types of knowledge are relevant in vocational settings and are equally important (Broad, 2016). Furthermore, teacher knowledge involves beliefs, views, values, and ideas of teachers (Eraut, 1994; Heusdens et al., 2018; Meijer et al., 1999; Schaap et al., 2009).

Besides from a sociocultural perspective, teacher knowledge is studied from other perspectives. Research on teacher knowledge from a cognitive perspective focusses on different types of knowledge teachers use in classroom situations, such as pedagogical knowledge, subject matter knowledge, and pedagogical content knowledge (Shulman, 1987). Next to this perspective, other researchers study teacher knowledge including the importance of teachers' beliefs, norms, and values, conceptualising this as practical knowledge (Malva et al., 2023; Van Driel et al., 2001). Practical knowledge typically integrates formal knowledge with a teacher's practical experiences as well as their conceptions about teaching and learning (Van Driel et al., 2001). Research on teacher practical knowledge is predominantly carried out in primary and secondary education and mostly focuses on classroom practices in which teachers interact with students (Anderson & Taner, 2023).

A focus on solely the primary process of teaching would disregard the wide range of knowledge vocational teachers need to carry out their vocation. In vocational education teachers spend a substantial part of their working time outside the classroom (De Bruijn et al., 2017). Prior research shows that vocational teachers' knowledge includes knowledge about (interacting with) vocational practices, participating in the wider school organisation, and designing and innovating educational programmes in interaction with their colleagues and stakeholders from vocational practices (**Chapter 3**; Johansson & Andersson, 2024). Building on these insights, we operationalise vocational teachers' knowledge using an existing broad framework on knowledge of professionals in general.

In line with a sociocultural perspective, this framework views teachers' knowledge as embedded in daily work practice, covering all settings in which vocational teachers work, and includes their teaching as well as their other tasks. It consists of two dimensions that describe their *vocational knowledge*, namely, the content and nature of teacher knowledge (Schaap et al., 2011; 2009) (see Table 4.1). Firstly, in this framework the content of knowledge is described in six components, referring to Eraut (1994): 1) knowledge of the occupational domain, 2) (teaching) processes and procedures, 3) the target group, 4) the organisational structure, 5) the professional environment, and 6) personal development. These components extend beyond knowledge of the primary process of teaching, covering knowledge of teachers' work environment and personal development, which are required for adequate performance of the teaching vocation (Billett, 2001a). The first three components of this framework are slightly comparable to the conceptualisations of Shulman (1987) and Van Driel et al. (2001) of teacher knowledge needed in teaching situations, such as pedagogical knowledge (e.g. some aspects of *occupational domain* like pedagogical principles), pedagogical content knowledge (e.g. *teaching processes and procedures* aligned with *target group knowledge*), and content knowledge (e.g. some aspects of *occupational domain* like new developments in professional practice). The latter three components refer to the knowledge vocational teachers need to execute the full extent of the teaching vocation. Secondly, the nature of vocational teachers' knowledge is described by aspects which refer to properties and structures of teacher knowledge (De Jong & Ferguson-Hessler, 1996; Van den Bogaart et al., 2016), encompassing concreteness, complexity, specificity, and richness (Schaap et al., 2011). The aspects emphasise both cognitive elaborateness (i.e., concreteness, complexity, and richness) and relevance (i.e., specificity) (Huijts et al., 2011). Ashley et al. (2017) show teachers' knowledge requires general, specific, abstract as well as concrete knowledge. For example, for solving problems in teaching practice, teachers require both knowledge that is more abstract or conceptual *and* situational knowledge that is more tangible and specific. Together these aspects of knowledge contribute to adequate performance of the teaching vocation (Billett, 2001a).

RESEARCH QUESTION AND DESIGN

To provide a more comprehensive understanding of vocational teachers' knowledge, the following research question was formulated: *What characterises the knowledge of experienced vocational teachers?* As explained in the theoretical background, teacher knowledge is partly tacit and encapsulated and therefore it is challenging for researchers to access and capture it (Boshuizen et al., 2020). To generate insight into the content and nature of teacher knowledge, researchers have used self-reports. A much-used method is concept mapping. Previous research has shown that concept mapping is useful for identifying teacher knowledge by using visualisations that articulate concepts and rela-

tions between these concepts (De Ries et al., 2022; Huijts et al., 2011; Meijer et al., 1999). We used concept mapping to provide an overall picture of teacher knowledge regarding their knowledge components (content) and the structure of this knowledge (nature). A repeated measures research design (Roos, 2022) was applied because it provides a more stable characterisation than a single snapshot that mitigates situational bias. Concept maps were constructed multiple times over a period of three years, through a tried-and-tested method of Van den Bogaart et al. (2016), to do justice to the broadness, complexity and uniqueness of knowledge of experienced vocational teachers.

Table 4.1. Framework of vocational teachers’ knowledge based on Schaap et al. (2011)

Dimension 1 Content	
Knowledge component	Description and examples
Occupational Domain (OD)	Knowledge about the specific practice of vocational teachers. For instance, knowledge about pedagogical views and principles, interacting with (adult) students, educational sciences, subject knowledge, general issues and trends in vocational education and society, or new developments in the occupational environment students are educated for.
(Teaching) Processes and Procedures (TPP)	Knowledge about processes, procedures, standardised actions, and the use of specific tools or instruments in vocational education. For instance, knowledge about (digital) teaching methods to help students learn the processes and procedures used in occupational practice, educational design processes, or assessment procedures.
Target Group (TG)	Knowledge about (adult) vocational students, such as background characteristics or youth culture.
Organisational Structure (OS)	Knowledge about the structural and cultural aspects of organisations. For instance, knowledge about rules and regulations for vocational schools or the culture of organisations in occupational practice.
Professional Environment (PE)	Knowledge about the social interactions in and around school organisations. For instance, knowledge about social relations in teacher teams or interacting with significant others.
Personal Development (PD)	Knowledge required for the development and learning of the individual teacher. For instance, knowledge about reflection or learning activities.
Dimension 2 Nature	
Aspect	Description
Concreteness	The degree to which teachers’ knowledge refers to concrete actions which are primarily based on personal experiences in practical situations.
Complexity	The degree to which teachers’ knowledge involves interconnections between concepts (elements), concepts and actions, such as consequences, influences, order or causes.
Specificity	The degree to which teachers’ knowledge involves vocational education or industry-specific elements, terminology (i.e. concepts) or jargon.
Richness	The degree to which teachers’ knowledge is distributed over the six knowledge components (see content).

METHOD

Context and participants

This study was performed in the Netherlands. Dutch vocational education qualifies at ISCED (International Standard Classification of Education) levels 2–4 and offers varied vocational programs for students starting at age 16, both initial training and lifelong learning (De Bruijn et al., 2017). Students can choose between two pathways, both consisting of one- to four-year programmes: full-time school-based routes that take place within schools and in companies in the form of apprenticeship, and dual work-based routes in which (adult) students are employees. Teachers in Dutch vocational education can be described as a heterogeneous group with respect to their background, ways of preparing for teaching practice, and expertise (De Bruijn et al., 2017). For the majority of these vocational teachers, teaching is a second career. Most vocational teachers start teaching in vocational education and receive training at teacher education institutes or they engage in a regular initial bachelor's programme in a more general subject (Van Renselaar et al., 2025). This research was conducted among vocational teachers who teach vocational subjects in school, mostly in school-based routes.

To transcend the specificity of one occupational field (Cohen et al., 2011), participants were recruited in two contrasting domains of business and welfare. Participants were recruited through purposive sampling. Experienced vocational teachers were approached to participate via an information letter, disseminated through the first author's network and social media posts. Selection criteria were teaching experience (>5 years; Berliner, 1994), contract size (>3 days per week), and scheduled contact hours with students (>8 hours per week). This resulted in 33 participating teachers (45% business and 55% welfare).

Due to time constraints, illness, and early retirement, 11 participants opted out during the first year. Twenty-two participants, from five different vocational schools, were included in the analyses (Table 4.2). All participants joined voluntarily and signed an informed consent form that was reviewed by the ethics committee of the HU University of Applied Sciences Utrecht (project no. 2019-01).

Instruments

To reveal vocational teachers' knowledge open concept mapping was used (De Ries et al., 2022; Novak & Cañas, 2007). This approach was chosen to gather self-reported rich data and enabled teachers to organise and visualise 'snapshots' of their knowledge three times (Heusdens et al., 2018). Teachers constructed concept maps via the computer programme Brainweaver® (Van den Bogaart et al., 2016), a digital reworking of the work of Schaap and colleagues (2011).

Teachers described concepts, relations between two concepts, and made annotations that describe their explanations, clarifications, or examples related to a concept or a relation. One concept or relation may have multiple annotations. A member check was done after the concept maps were constructed to check for completeness. The concept mapping and member check guidelines were thoroughly piloted with educational experts, experts on research methodology, and teachers who were not included in this study (see Appendix J).

Table 4.2. Demographic information.

Variable	n	Domain of welfare	Domain of business
Participants	22	11	11
Gender			
Female	13	9	4
Male	9	2	7
Age			
Mean	44	43	44
Range	27 - 57	27 - 56	29 - 57
Years of teaching experience			
Mean	11	13	9
Range	5 - 18	5 - 18	5 - 16

Procedure

Teachers constructed concept maps annually for three years (2018-2020). Each year a two-hour concept map construction session was held which resulted in the first version of the concept maps, followed by a member check.

Firstly, participants were thoroughly introduced to the goals and design of the study and the technical aspects of the computer programme Brainweaver by the first author. An infographic and a concept map format on paper developed in the pilot phase supported this introduction. Secondly, participants constructed a concept map via Brainweaver with the focus: *“As an experienced teacher in the domain of [welfare or business] I have knowledge of and views on ...”*. Next, the first author checked the constructed concept map for completeness (for example annotations that were half written) and comprehensibility. Two weeks after the construction of the first concept map a member check was conducted by telephone. After the member check the concept map was supplemented. This version was sent to the participating teachers for approval, which was granted in all cases. The data gathering procedure resulted in 66 concept maps which were used for data analysis (see for example Figure 1).

Data analysis

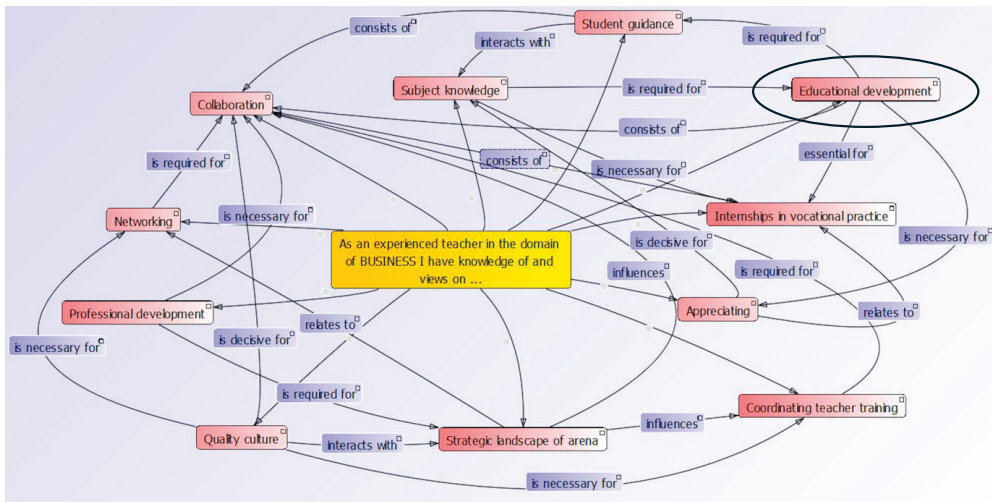
To analyse the content and the nature of the concept maps, an eight steps procedure was followed (Miles et al., 2014) that was partly supported by the computer program Brainweaver. Basically, to analyse the content and nature of the entire concept map, parts (clusters) of the concept map were judged. To judge clusters in a concept map all annotations were coded.

In the first step, the concept maps, including annotations and relations, were printed and thoroughly read. In the second step, a coding scheme for six knowledge components (content) and four aspects of nature was developed based on the framework of Schaap and colleagues (2011; 2009). To enhance the quality of the coding scheme, initial codes (on the level of annotation) were discussed with an expert in the domain (welfare or business) and an expert in vocational education. This resulted in a more precise coding scheme.

In the third step, the coding scheme was checked for reliability by determining interrater reliability. Two concept maps of two participants who opted out of the project were independently coded by the first and third author using this adapted coding scheme. In total 526 codes were assigned to annotations of both concepts and relations of which, at first, 75% were identical. Differences (129 codes) were discussed between the two coding authors until agreement was reached. Fourteen codes in which they found no agreement, were discussed with the entire research team until a consensus was reached. Step three resulted in a final coding scheme (Table 4.3).

In the fourth step, all annotations in all concept maps were coded for content and nature supported by the 'assessment' module in Brainweaver. More specifically, all annotations of concepts were assigned one code for the content dimension (i.e. one of the knowledge components), and all annotations of concepts and relations were assigned a code for the nature aspects (i.e. complexity, specificity, concreteness) (Schaap et al., 2011) (see the first column in Table 4.3). In addition, each relation between two concepts was always labelled 'complex' because a relation represents complexity in itself (Van den Bogaart et al., 2016). Themes within the six knowledge components were established inductively and were coded manually. Examples of themes were discussed within the research team in several rounds to come to agreement.

In the fifth step, Brainweaver divided the concept map into clusters of a single concept with all its annotations and relations with other concepts (Van den Bogaart et al., 2016) (see for example Figure 4.1). All clusters in a concept map were coded for three nature aspects. Following Huijts et al. (2011) and Schaap et al. (2011), the levels of complexity, specificity, and concreteness of a cluster were defined as 0 (less than average), 1 (average) or 2 (more than average) (see the cluster column in Table 4.3 for cut-off rules).



Cluster

Concept: Educational development

Annotation with concept:

- [school] Vision: hybrid, innovative, personal learning. Important to conform to it [as a teacher].
- Individual teaching philosophy: career coaching is part of learning together with vocational practice. As a professional you never want to stop developing [yourself].
- Curriculum development: developing an educational programme, linked to the schools' vision on education. How do you involve each cohort [of students] in this process, including evaluation and improvement? Structure and clarity provide peace of mind and space for students.

Relations with other concepts and annotations with these relations:

Relation 1: *Educational development (concept) à consists of à Collaboration (concept)*

- Educational development is a collaborative effort with colleagues and students.

Relation 2: *Educational development (concept) à is necessary for à Appreciating (concept)*

- To develop the assessment process.
- To guarantee the quality of our education and assessment.

Relation 3: *Educational development (concept) à essential for à Internships in vocational practice (concept)*

- Making choices for internships: continuous internships or centered internships.

Relation 4: *Educational development (concept) à is required for à Subject knowledge (concept)*

- Developers [of educational programmes] must know what education is all about

Relation 5: *Educational development (concept) à is required for à Student guidance (concept)*

- Developing a programme for study and career guidance [for students].
- Indicating your own professional development question [as a teacher]
- Building a relationship with students.

Figure 4.1. Example of a complete concept map and a cluster of one concept including relations and annotations visualised in Brainweaver (business teacher).

In the sixth step, to analyse the *entire* concept maps, the levels of complexity, specificity, and concreteness of a concept map were calculated as an arithmetical means over all its clusters and expressed in a percentage (see concept map column; Table 4.3). The richness of a concept map was calculated based on the distribution over the six knowledge components in Brainweaver.

In the seventh step, as an additional quality check, face validity of part of the concept maps was determined to see if step 6 results, at face value, seemed accurate (Gaber & Gaber, 2010). To establish face validity, 22 concept maps of the first data collection period were ordered by the first author based on the content and nature aspects (high – average – low quality). Next, the two highest, the two lowest, and the two average concept maps were independently ranked by the second author. This resulted in two differences in ranking (between average and low) that were discussed in the research team. The ranking and accompanying discussion showed that face validity of the concept map as a whole was very close to the more procedural analysis in the first six steps.

In the final, eighth step, to gain insight into the robustness of the three measures of vocational teachers' knowledge, the calculated means of the four nature aspects were compared between the three concept maps. A one-way repeated measure ANOVA's was used to test if there were significant differences between the measurements for the four nature aspects.

No significant differences were found for *concreteness*, *specificity*, or *richness* between the three measurements (see Table 4.4). A statistically significant difference was found for the aspect *complexity* ($F(df\ 2, 42) = 3,24; p = 0,05$). Due to the small sample size, this result should be interpreted with caution and was not considered robust enough to challenge the overall reliability of the method. These findings suggest that the concept mapping method consistently captured vocational teachers' knowledge across time, supporting its reliability.

RESULTS

In the following sections, first the results regarding the content of vocational teachers' knowledge are presented followed by the nature of vocational teachers' knowledge. Both dimensions are illustrated with representative examples of teachers' annotations.

The content of vocational teachers' knowledge

The data to characterise the content of vocational teachers' knowledge (Figure 4.2) comprised 1816 annotations coming from all 66 concept maps. On average teachers described five knowledge components per concept map, ranging from two to six compo-

nents. The identified themes that illustrate the knowledge components and frequencies are presented in Table 4.5.

The *Occupational Domain* (OD) component is highly present in teachers' knowledge (41%). This knowledge concerns the specific vocational practice of teaching in vocational education. Five themes were identified. The component mostly involves knowledge about teaching and coaching students. This component also involves knowledge about vocational education in general, for example, a teacher describes knowledge about the strong connection between theory and practice in vocational education: 'lessons about a specific subject are linked to the workplace, to internships of students, theory exams and to assessments in the workplace. ... these [components] are all connected'. Next, teachers describe knowledge related to the industry or subjects they are preparing students for. One teacher describes:

It is important to know [as a teacher] what is expected in the occupational field. This is sometimes underestimated or overestimated by students. ... For example, students are not allowed to wear sweatpants to school, because that does not fit in with the occupational field for which students are educated.

In addition, teachers articulate knowledge about the teaching vocation in general and changes in society and politics that influence vocational education and their teaching, such as the impact of AI or social media on students.

The *(Teaching) Processes and Procedures* (TPP) component covers 21% of teachers' knowledge. This component involves knowledge about how teachers practice the teaching vocation. Six themes were identified. Teachers describe knowledge about teaching methods, strategies, tools and procedures they use for teaching and coaching students.

Furthermore, this component includes knowledge about the procedures, processes and tools for curriculum development, such as instruments or step-by-step plans and structures regarding curriculum development. One teacher describes knowledge about: 'the structure of the educational programme and the parts from which the curriculum is developed: basic, profile, free-choice and generic parts. ... You need this knowledge to indicate to students in which phase of the programme they are'. Teachers also articulate knowledge about assessment processes and procedures and knowledge about digital teaching methods and procedures. And this component encompassed procedures and strategies for executing tasks and roles, such as the process of working cyclically related to quality structures or procedures for evaluating educational programmes. Finally, teachers describe knowledge about methods and procedures they use related to 'the way things are done in the vocational practice students are prepared for'. A teacher describes her teaching methods related to the vocational practice:

Table 4.3. Coding scheme.

	Level in concept map	
	Annotation	Cluster
	Concept map	
Knowledge components	<ul style="list-style-type: none"> Occupational Domain (Teaching) Processes and Procedures Target Group Organisational Structure Professional Environment Personal Development 	
	Nature aspect	
Concreteness	<p>Not concretely formulated: Abstract, formulated vaguely, general description.</p> <p>Concretely formulated: What, where, when, with whom; elaboration of a concept; clear example of experience related to the concept.</p> <p>For example: 'Have insight into the formal qualification framework of a pedagogical worker'.</p>	<p>Less than average (0 points) The number of concrete annotations in the cluster is 1 or <1.</p> <p>Average (1 point) The number of concrete annotations in the cluster is 2 or 3.</p> <p>More than average (2 points) The number of concrete annotations in the cluster is > 3.</p>
		Arithmetical means over all clusters For example: (see Figure 4.1) A concept map may consist of ten clusters. The maximum level of concreteness of all clusters together then is 20 (10 clusters x maximum of 2 points per cluster = equals 100%). After coding all annotations and clusters, the level of concreteness of in this concept map is determined at 17 clusters were coded 'more than average', 7x2 points, and 3 clusters were coded 'average', 3x1 point). The level of concreteness is than calculated at 85% (17x100/20).
Complexity	<p>Not complexly formulated: No connection formulated between elements within an annotation</p> <p>Complexly formulated: Connection formulated between two or more elements within annotation</p> <p>For example: 'The school's frameworks are developed based on its vision for and influence on educational programmes.'</p> <p>Complex: Relation between two concepts</p>	<p>Less than average (0 points) The cluster consists of one concept with at most one relationship to another concept and the cluster contains no annotations.</p> <p>Average (1 point) The cluster contains one concept with: a) two relations to other concepts and no annotations, or b) one relation to another concept and annotations.</p> <p>More than average (2 points) The other cases.</p>
		Arithmetical means over all clusters.

Table 4.3. Coding scheme. (*continued*)

	Level in concept map	
<i>Specificity</i>	<p>Not specifically formulated: General aspects (of teaching). Specifically formulated: Jargon matching vocational education. For example: 'Hybrid learning in education is a good combination of practice and school'.</p>	<p>Less than average (0 points) The number of specific annotations in the cluster is 1 or <1. Average (1 point) The number of specific annotations in the cluster is 2 or 3. More than average (2 points) The number of specific annotations in the cluster is > 3.</p>
<i>Richness</i>		<p>Arithmetical means over all clusters</p> <p>Equal distribution of the components $((1/12 \times a + 1/12 \times b) \times 100)$ a: number of components with a positive frequency b: number of components with a relative frequency between 12% and 25%. (Van den Bogaart et al., 2016).</p>

Table 4.4. Results of one-way repeated measures ANOVA

	CM1 Mean* (SD)	CM2 Mean* (SD)	CM3 Mean* (SD)	F-value (degrees of freedom); p-value
Concreteness	80 (17)	84 (14)	89 (13)	F(df 2, 42) = 2,60; p = 0,09
Complexity	94 (7)	98 (6)	98 (11)	F(df 2, 42) = 3,24; p = 0,05
Specificity	55 (25)	55 (23)	56 (22)	F(df 2, 42) = 0,06; p = 0,95
Richness	53 (14)	56 (17)	53 (18)	F(df 2, 42) = 0,45; p = 0,64

I prepare students to become a pedagogical worker in the future. As a pedagogical worker it is important to ask children questions during lessons. ... Through my lessons I show what behaviour and actions are expected of students in vocational practice.

The *Professional Environment* (PE) component (15%) consists of knowledge about the social aspects of the teaching vocation. We identified four themes that teachers described in this component. The most knowledge teachers describe is related to interacting with colleagues in their teacher team and in their own school organisation, such as formal and informal interactions with other teachers, student teachers, school leaders, or policy advisors. This component also includes knowledge about interacting with vocational practices students are prepared for. One teacher describes: 'as a teacher I need to know what is happening in the companies. ... During internship visits I ask [professionals] about marketing tools. ... You need to make use of these kinds of opportunities as a teacher'. In addition, teachers articulate knowledge about interacting with significant others outside the school organisation, such as teachers and experts from other vocational schools, secondary education schools, suppliers or policy agencies, or interacting with others related to students, such as students' parents or student counsellors.

The *Organisational Structure* (OS) component covers 12% of the knowledge described by vocational teachers. This component involves knowledge about structural and cultural aspects of organisations. It includes four themes such as knowledge about school structures, for example regarding tasks and roles concerning teacher education, procedures for addressing student complaints, or the role of career counsellors in a teacher team. This component also includes knowledge about school culture, such as agreements about using email or social media. Next, teachers describe knowledge about rules and regulations in vocational education in general that influence the structure and policies in vocational schools, for example rules on study advice, formal educational hours for students and workplace learning. Several teachers described knowledge about the structure of organisations outside their schools, such as organisations in vocational practice and other organisations, such as regional municipalities where truancy officers work.

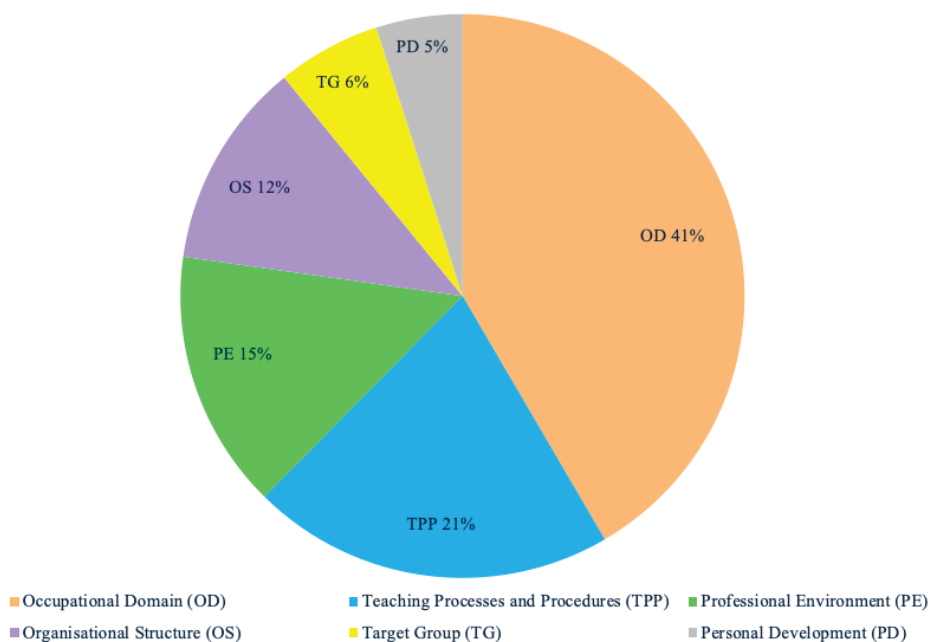


Figure 4.2. Content of vocational teachers' knowledge.

The *Target Group* (TG) component involves two themes of knowledge: students from full-time vocational education and students from part-time education. This component covers 6% of teachers' knowledge. Teachers describe knowledge about characteristics, needs, and cultural aspects of their students. A teacher describes about full-time students: 'students must let go of the "concept of school". They [students] show school behaviour at school and in occupational practice they [students] are more serious. Students do not perceive school as a place to learn a vocation'. Regarding part-time students, a teacher describes knowledge about 'creating individual learning plans for part-time students' educational trajectories because the initial situation of these students is very diverse'.

The *Personal Development* (PD) component involves the professional development and learning of vocational teachers (5%). Three themes were identified in this component. The component involves knowledge about how teachers (want to) learn and what motivates them to learn and stay up to date. Teachers describe knowledge of informal learning in their workplace, on one's strengths and weaknesses (self-knowledge) and on formal professional development activities they undertake, such as class visits with colleagues or a conference visit about (infant) care. Concerning informal learning teachers describe, for example, to learn because 'new colleagues ask questions that make me more aware of what I am doing' or 'by gaining experience in vocational practice to make the connection [between school and practice]'.

Table 4.5. Content and themes of vocational teachers' knowledge.

Knowledge component and themes	Frequencies		
	Total	Business	Welfare
Occupational Domain (OD)	754	354	400
Knowledge about the pedagogical practice of teaching and coaching (adult) students related to interaction with students.	317	102	215
Knowledge about developments and changing educational views in vocational education in general, such as learning in hybrid learning environments.	203	123	80
Domain-specific and subject related knowledge, such as healthcare technologies or market developments in the business domain.	152	86	66
Knowledge about developments related to the teacher vocation in general, such as educating student teachers.	52	24	28
Knowledge about (changes in) society, such as the influence of digitalisation on education and learning of (adult) students.	27	16	11
(Teaching) Processes and Procedures (TPP)	375	186	189
Knowledge about teaching methods, strategies, tools and procedures, such as lesson structure or classroom management strategies.	148	53	95
Knowledge about curriculum development processes, such as designing project-based education in the context of business.	74	50	24
Knowledge about assessment processes and procedures, such as assessments in vocational practices.	50	38	12
Knowledge about digital teaching methods and procedures, such as digital programmes or tools used in education and occupational practice.	40	18	22
Knowledge about procedures and strategies for executing tasks and roles in schools, such as coordinating workplace learning.	36	21	15
Knowledge about methods and procedures used in occupational practice and used as a teaching strategy, such as applying playful learning in lessons in Welfare.	27	6	21
Professional Environment (PE)	270	138	132
Knowledge about (social) interacting and collaborating with colleagues or school leaders.	166	76	90
Knowledge about interacting with vocational practice, such as business industry or welfare organisations.	69	35	34

Table 4.5. Content and themes of vocational teachers' knowledge. (*continued*)

	Frequencies	
Knowledge about interacting with stakeholders in vocational education, such as exam suppliers or policy agencies.	25	21
Knowledge about interacting with actors related to students, such as parents or student counsellors.	10	6
Organisational Structure (OS)	223	110
Knowledge about school structure, such as roles and hierarchical lines.	148	68
Knowledge about school culture, such as using email or social media.	34	19
Knowledge about rules and formal regulations in vocational education, such as vocational educational standards.	31	16
Knowledge about structures of organisations outside school boundaries, such as occupational practices.	11	8
Target Group (TG)	101	51
Knowledge about full-time students, such as students' background or characteristics.	100	51
Knowledge about (adult) parttime students, such as diversity in starting situations.	1	1
Personal Development (PD)	92	29
Knowledge about informal (workplace) learning, such as staying up to date.	38	16
Self-knowledge, such as one's own strengths and weaknesses.	38	8
Knowledge about formal professional development activities, such as training programs.	16	5
Total	1816	

The Nature of vocational teachers' knowledge

The data that characterise the nature of vocational teachers' knowledge comprised 2742 annotations, utterances referring to concepts and relations. These were coded for their concreteness, specificity, complexity and subsequently for richness. In Table 4.6, the nature of vocational teachers' knowledge is expressed in percentages that represent the average level of the four nature aspects in the three concept maps together, and, next, we elaborate more on these findings.

Concreteness reflects the degree to which teachers' knowledge refers to actions which are primarily based on personal experiences in practical situations. For concreteness, results show that when teachers express their knowledge regarding their vocation in concept maps, they tend to make concrete statements (84%). They refer to actions which are primarily based on personal experiences in practical situations. For example, a teacher describes a specific action she takes when guiding students in their learning process: 'I listen to the student and do not try to think for the student but offer tools to help the student with an issue or dilemma'. Another teacher describes a concrete action regarding the interaction with vocational practice: 'I'm in contact with the [vocational] field about developments in the various sectors: retail and web shops'.

Complexity is the degree to which teachers' knowledge involves interconnections between concepts and concepts and actions. Overall, the results show most annotations teachers make are complex (97%). When teachers talk about their vocation, they connect concepts to other concepts, and concepts with actions. For example, concepts are connected by terms such as 'is required for', 'consist of' or 'influences'. In addition, within an annotation teachers connect concepts and actions by describing relations, influences, if-then reasoning, cause and effect connections, consequences for and explanations of their knowledge. A teacher explained for example the interconnection between knowing your colleagues and thus, be able to make use of each other's qualities:

Table 4.6. The nature of vocational teachers' knowledge.

Aspects		%	Business	Welfare
Concreteness	Mean (SD)	84 (15)	86 (16)	83 (14)
	Range	25 - 100		
Complexity	Mean (SD)	97 (7)	95 (7)	98 (7)
	Range	68 - 100		
Specificity	Mean (SD)	56 (23)	66 (25)	45 (23)
	Range	15 - 100		
Richness	Mean (SD)	54 (16)	51 (14)	58 (18)
	Range	17 - 92		

I have contact with several colleagues within the school in which we stand up for the role of teachers ... I think it is important that you network within your own organisation so that you can use each other's knowledge and expertise.

Specificity refers to the degree to which teachers' knowledge involves vocation-specific terminology (i.e. concepts) or jargon. We found that in 56% of the annotations, this vocation-specific language is used. There are differences between domains in this regard. Teachers in the business domain explicate their knowledge in a more specific way (66%) than their colleagues in the welfare domain (45%). The specific annotations involve both knowledge related to vocational education in general, such as: 'vocation-specific knowledge and skills and hybrid learning', and specific vocational knowledge related to the industry students are educated for. For example, a teacher articulated her knowledge about the business domain: 'Regarding commercial subjects, companies [in the business domain] work more project-based. ... Students must learn to solve problems they encounter [in these projects]'.

Richness relates to the degree to which teachers' knowledge is distributed over the six knowledge components (see Figure 4.2). The average score for richness was 54%. Regarding richness, the annotations are not equally distributed over these components per concept map.

Teachers' knowledge in business and welfare domain

Table 4.7 highlights the most distinguishing features in content and the nature between the business and welfare domain. Welfare teachers describe more knowledge on the primary process of teaching, including pedagogical competence and teaching approaches, and the collaborations within the school and student-centred networks. In contrast, business teachers use more vocationally or industry-specific terminology and highlight interactions beyond their school.

Table 4.7. Teachers' knowledge in business and welfare domain.

Dimension	Domain	
Content	Business	Welfare
Occupational Domain (OD)	More knowledge about (changes in) general vocational education and society, and knowledge related to the business domain.	More knowledge related to the pedagogical practice of teaching and coaching (adult) vocational students and what this means to be a teacher.
(Teaching) Processes and Procedures (TPP)	More knowledge about the continuous process of re-designing educational programmes, a focus on assessments procedures (in occupational practice) and coordinating workplace learning.	More knowledge related to teaching (digital) methods and strategies for learning in classroom settings and using methods and procedures used in occupational practice as a teaching strategy.

Table 4.7. Teachers' knowledge in business and welfare domain. (*continued*)

Dimension	Domain	
Professional Environment (PE)	More knowledge about interacting with general stakeholders in vocational education outside their own school, such as suppliers or policy agencies.	More knowledge focussed on collaborating within teachers' own school, mostly colleagues and school leaders.
Organisational Structure (OS)	More knowledge about formal structures of organisations outside school boundaries, such as occupational practices in business.	More knowledge about the formal school structure, such as roles and hierarchical lines in schools.
Target Group (TG)	Teachers in both domains are mostly focussed on full-time students.	
Personal Development (PD)	Knowledge is solely focussed on staying up to date through informal learning, although professional development is not naturally prioritised.	More knowledge emphasised on self-reflection and learning through both informal and formal professional development.
Nature	Business	Welfare
Concreteness	High – Teachers in both domains refer to concrete actions and personal experiences (86% and 83% respectively).	
Complexity	Very High – Teachers in both domains connect elements, concepts, and actions (95% and 98% respectively)	
Specificity	High – More vocational and occupational specific terminology (66%)	Medium – More general pedagogical jargon (45%)

DISCUSSION AND CONCLUSION

This study aimed to characterise the knowledge of experienced vocational teachers. During three years they repeatedly articulated content and nature of their knowledge in concept maps. While other research often isolates specific aspects of teachers' knowledge, our findings cover teachers' knowledge to the full extent of the teaching vocation and shows how vocational teachers navigate between pedagogical, domain-specific, and contextual demands covering the various teaching settings. The dynamics of the teaching vocation becomes visual in 24 themes identified in the concept maps. Moving beyond these 24 themes, the study reveals a view of teachers' knowledge as a multifaceted, relational, and situated construct, that is relatively concrete, specific, and complex. This reflects the dynamic nature of vocational teaching where knowledge is continually integrated and reshaped (Ashley et al., 2017).

A central insight in this study is the integration of pedagogical and domain and subject-specific knowledge - also visible in the large presence of Occupational Domain (OD) and Teaching Processes and Procedures (TPP) in the concept maps. Vocational teachers do not experience these domains as separate but as deeply intertwined. Therefore, this result reflects the interrelatedness of knowledge components in the teacher vocation and

resonates with Shulman (1987) concept of ‘pedagogical content knowledge’. However, in the vocational education context this knowledge refers to the interrelation of educational rationales and those of vocational practice (Antera, 2022), asking of teachers to align teaching strategies with workplace expectations, including content, stakeholders and teaching methods of a particular occupation (Johansson & Andersson, 2024). This is also visible in the presence of knowledge about Professional Environment (PE) and Organisational Structure (OS). Thus, rather than being static, this knowledge reflects an ongoing negotiation between school and occupational practice, matching the nature of being a teacher in vocational education in the Netherlands.

Our findings also reveal variation across vocational domains; the specific field teacher educate for highly colours their knowledge (Berliner, 2001). We found distinguishing characteristics in teachers’ knowledge between teachers in the domain of welfare and domain of business. Teachers in welfare education emphasise pedagogical and interpersonal skills and focus on the primary process of teaching which is directly related to interacting with their students and colleagues. While business teachers emphasise knowledge related to the ‘external-oriented’ nature of vocational education such as industry specific elements in business or more general development in vocational education on national level. Due to the ill-structured nature of the business domain and the widespread domain of vocations in it (see Ashley et al., 2017) they are more engaged in continuously re-designing and innovating educational programmes. Their knowledge is more structured around networks they participate in inside and outside their schools, which provide an entrance to this ‘external’ knowledge. In this sense, these findings are likely to be as much a reflection on the context of vocational education itself as the culture of the vocational practice teachers prepare students for.

Another striking finding is the limited articulations of teachers’ professional learning. Only a small fraction, namely 5% of the knowledge statements refers to self-development or informal learning. This may suggest that much of teacher’s professional growth remains tacit or is taken for granted. Yet, it also highlights a blind spot: vocational teachers may be highly engaged in supporting student learning and curriculum development, but less explicit about investing in their own ongoing learning. This tension aligns with Eraut’s (2000) observations on tacit knowledge and raises questions about how professional learning can be made more visible and intentional in vocational settings.

Finally, this study shows that, in line with Anderson and Taner (2023), there is no ‘prototype’ vocational teacher, on the contrary, our study acknowledges variety and highlights individual differences; vocational teachers’ knowledge goes beyond what meets the eye. Furthermore, given the absence of a well-defined framework of vocational teachers’ knowledge (cf. Andersson & Köpsén, 2018), this study contributes to the further development of such a framework.

Limitations and further research

Our study has some limitations. Firstly, although the development of knowledge was not the focus of this study, the repeated measures design shows that vocational teachers' knowledge is relatively stable (Antera, 2022; Depaepe et al., 2013). Nevertheless, on the individual level, vocational teachers accentuate different themes per concept map (Van Driel et al., 2001). Further research could study these changes and provide insight into the *development* of teacher knowledge and the activities that enhance the development of vocational teachers' knowledge. Secondly, prior research shows that knowledge of experienced professionals becomes more tacit and encapsulated over time (Eraut, 2000; Boshuizen et al., 2020). In our research design, explicit knowledge may be dominant. Further research could use additional research methods that are more closely to the daily practice of teachers, such as stimulated recall methods, to increase the chance of capturing tacit knowledge. Thirdly, the Brainweaver software supported teachers to explicate their knowledge in concept maps, and our framework enabled the authors to analyse the content and nature on concept map level through coding each annotation separately. However, assigning multiple codes for different content visible in a single annotation was not possible. Therefore, the relations between knowledge components *within* each annotation was not included in the analysis, for instance, in line with literature on pedagogical content knowledge, the relation between knowledge on characteristics of students (Target Group) and the pedagogical practice of coaching these students (Occupational Domain) within one annotation. Furthermore, the dichotomous coding of the nature of teacher knowledge (e.g. 'not concretely formulated' or 'concretely formulated') may underrepresent its true complexity. Rather than a linear hierarchy, knowledge may be better understood as dynamic flows between principles and applications. Like Ashley et al. (2017) argue, vocational teaching requires both abstract and concrete knowledge *as well as* general and specific forms of knowledge. Further research and the development of the Brainweaver software could address these limitations. Legitimation Code Theory, drawing on sociological theories of knowledge and meaning-making, may offer a useful additional framework to further explore teachers' knowledge and capture the (changes in) construction and relational nature of teacher knowledge (Bowdler et al., 2024).

Fourthly, in this study we manage to capture a rich data set of vocational teacher knowledge over time and focusing on both nature and content. Due to several constraints, particularly those related to the analytical tool, we chose to primarily focus on four nature aspects. Further research could include a deeper dynamic analysis of the concept maps focused on, for example, investigating inferential relationships in vocational teachers' knowledge. Finally, our study included 22 experienced vocational teachers who teach in the domain of business and welfare. In future research, more teachers from other domains in vocational education, teachers from other sectors such as primary and secondary education, and novice teachers may be included using our framework. It may be

worthwhile to study similarities and differences of what characterises teacher knowledge between sectors or during different career phases.

Conclusion

This study offers in depth insights into the knowledge of experienced vocational teachers in the context of Dutch vocational education. Teachers' knowledge is influenced by the specificity of both vocational education and the vocational domain. Through repeated concept mapping our study reveals the multifaceted nature of the teaching vocation. This contribution offers a view on vocational teachers' knowledge covering the full extent of their vocation. By capturing this broader range of vocational teachers' knowledge, our study extends the dominant focus on classroom interactions in research on primary and secondary education. We suggest that schools and teacher teams use this view to inform professional development programmes and to support ongoing dialogue about (novice) teachers' current and future vocation.



5

Narratives of vocational teachers' continuing professional development

ABSTRACT

Continuing professional development (CPD) of vocational teachers is essential for ensuring educational quality of vocational education. In research on professional development, vocational teachers remain under-researched. In prior research, three CPD profiles were identified reflecting experienced vocational teachers' professional orientations. For three years, data was gathered on a) activities that elicit teachers' learning through learner reports, b) learning outcomes through semi-structured interviews and concept mapping and c) contributing factors through semi-structured interviews. To enhance our understanding of what CPD of experienced vocational teachers looks like in practice, we conducted a secondary analysis of the previously collected qualitative data, using narrative analysis. This article presents the results as three narratives of vocational teachers' CPD. For each CPD profile one representative teacher was selected for illustration. Our study shows how CPD takes shape in teachers' daily practice and the coherence between activities, learning outcomes, and contributing factors, reflecting a particular professional orientation of a vocational teacher. This study could facilitate a meaningful dialogue within schools about teachers' CPD and how to facilitate their learning.

Keywords

Continuing professional development; vocational education and training; experienced teachers; learner report; concept mapping; semi-structured interviews; narrative analysis

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6

General discussion

INTRODUCTION

The aim of this dissertation is to gain comprehensive understanding of how experienced vocational teachers develop professionally. The quality of vocational teachers is key in students' development and, therefore, understanding continuing professional development (CPD) for experienced vocational teachers is crucial (Zhou et al., 2022). Gaining an understanding is important because experienced vocational teachers' continuing professional development (CPD) in the specific context of vocational education is rather understudied (Antera & Teräs, 2024; Rice et al., 2024). Vocational teachers occupy a unique professional space. They are required to maintain up-to-date expertise in their vocational field while simultaneously developing pedagogical skills, and many enter teaching from vocational practice rather than through traditional teacher education routes. Teaching in vocational education specifically relies on vocational knowledge and skills and is closely connected to learning in and from practice. The research presented in this dissertation offers valuable insights that complement the existing body of knowledge on teacher professional development through adopting a broad scope of the teaching vocation and studying the CPD of vocational teachers within the multifaceted nature of the vocational education practice.

Four studies were conducted to answer the central research question of this dissertation: *How do experienced vocational teachers develop professionally?*

To answer the central research question and to gain a comprehensive understanding of how experienced vocational teachers develop professionally three aspects were studied: which *activities* teachers undertake to develop, what *learning outcomes* these activities lead to, and which *factors* support their learning. To study the full extent of learning outcomes two analytical dimensions were adopted: learning outcomes focussed on experienced changes in thinking and acting (Bakkenes et al., 2010), and learning outcomes focussed on teachers' articulated knowledge (Schaap et al., 2009; 2011).

To answer this research question, longitudinal data were collected for four interconnected empirical qualitative studies. Data collection spanned two-and-a-half years for the studies described in **Chapter 2** and **Chapter 3**, and three years for the studies described in **Chapter 4** and **Chapter 5**. The study described in **Chapter 2** identifies formal and informal professional development activities undertaken by experienced vocational teachers to develop professionally. The study in **Chapter 3** sheds light on activities, perceived changes in thinking and acting (learning outcomes, dimension 1), and contributing factors to characterise teachers' CPD. The study described in **Chapter 4** delved into the content and nature of teachers' knowledge (learning outcomes, dimension 2). Finally, **Chapter 5** builds upon the previous studies through secondary analysis of data collected for the prior chapters offering an in-depth view on experienced vocational teachers' CPD

and shows the coherence between activities, learning outcomes, and contributing factors. Together these four studies give insight into the three aspects (activities, learning outcomes, and factors) and *how* experienced vocational teachers develop professionally.

In the following sections, the key findings of the four studies are first summarised. This is followed by a discussion of the contribution of this dissertation to the body of knowledge, positioned within existing literature. A methodological reflection is then presented, and finally, the implications for future research and for practice are discussed.

KEY FINDINGS

The purpose of **Chapter 2** was to understand and typify the formal and informal professional development *activities* experienced vocational teachers undertake that elicit their learning. In this study 26 experienced teachers detailed 386 activities in six learner reports during two-and-a-half-year time period. The study resulted in a typology of five formal and six informal categories of professional development activities. Analyses revealed that three quarters of the described activities were informal and embedded in teachers' daily practice. Professional development activities are likely to be rooted in and encouraged by the dynamics of the workplace of vocational teachers and differ per teacher. The activities vocational teachers mention as triggers for learning are often closely related to coaching their students in both the classroom and in vocational practice, and to adapting, innovating, and re-designing vocational curricula. The study also shows that vocational teachers develop themselves because of their interaction and cooperation with their colleagues, students, stakeholders from vocational practice, and professionals outside of their own school.

Chapter 3 characterised the CPD of vocational teachers in terms of professional development *activities* in relation to perceived changes in thinking and acting (*learning outcomes*, dimension 1) and perceived contributing *factors* to these changes. Perceptions of twelve teachers were gathered during a period of two-and-a-half-years through six learner reports and two semi-structured interviews per teacher, which resulted in a total of 72 learner reports and 24 semi-structured interviews. The professional development activities, perceived changes in thinking and acting, and perceived contributing factors described in the learner reports and interviews were analysed and resulted in the identification of three CPD profiles: professional development focusing on (1) the primary process of teaching students, (2) executing tasks and roles in school, or (3) oneself in relation to the wider context of vocational education. The study concludes that these profiles seem to reflect diverse dominant professional orientations teachers may have towards their work, and therefore, towards their CPD in the specific context of vocational education. These orientations are not limited to learning centred around student-teacher inter-

actions. Vocational teachers' CPD seems focused on both the primary process of teaching and on the tactical and strategic level of teaching in (large) educational organisations, such as forming a vision on education or implementing educational innovations.

The purpose of **Chapter 4** was to characterise the nature and content of vocational teachers' knowledge (*learning outcomes*, dimension 2). Over three years, 22 experienced vocational teachers annually constructed concept maps to articulate their knowledge, which resulted in the construction of 66 concept maps. All concept maps were analysed for content through using six knowledge components (occupational domain, teaching processes and procedures, professional environment, organisational structure, target group, and personal development) and analysed for nature of knowledge through using four nature aspects (concreteness, complexity, specificity, and richness). Results show that the content of teachers' knowledge comprises knowledge reflecting the specific characteristics of vocational education, for example knowledge about the process of instructing and coaching students, students' vocational practice, organisational knowledge both inside and outside school boundaries, and knowledge about navigating between stakeholders and contexts. The dynamics of the teaching vocation is also visualised in 24 themes identified within the six knowledge components. The study found that the nature of teachers' knowledge is relatively concrete, specific, and complex. The findings of this study indicate that teachers' knowledge covers the full extent of the teaching vocation in vocational education, is multifaceted in terms of content and nature, and is highly coloured by the specific field teacher educate students for.

Chapter 5 aimed to illustrate the CPD of three experienced vocational teachers, each representing a CPD profile identified in previous research (**Chapter 3**) and reflecting vocational teachers' professional orientations. A narrative analysis of previously collected qualitative data from **Chapter 2, 3, and 4** was employed to capture and interpret the lived experiences of these teachers. The analysis resulted in three in-depth and comprehensive narratives: Elizabeth, as a representative of profile 1 ('teaching-and-innovation' oriented); Olivia, as a representative of profile 2 ('reflection-and-collaboration' oriented); and Nathan, as a representative of profile 3 ('strategic-and-career' oriented). The narratives of these three experienced vocational teachers show how CPD takes shape in daily practice and the coherence between *activities*, *learning outcomes*, and *contributing factors*. These three aspects form a dynamic and integrated whole, reflecting the complexity of vocational teachers' CPD. Within their professional orientations, vocational teachers have different unique professional and personal themes. These unique themes in teachers' CPD highlight the importance of acknowledging teachers' personal goals, aspirations, their professional learning needs and motivations, as these shape how teachers engage in professional development, what they perceive as meaningful learning, and how CPD is translated into practice. Recognising these individual differences underscores that CPD is not a uniform process but a personal endeavour.

GENERAL DISCUSSION

Drawing on a sociocultural perspective (Billett, 2004; Evans, 2019), this dissertation reveals how CPD of experienced teachers in vocational education is embedded in the teaching practice of vocational education, both within and beyond the school context. The findings, as summarised in the previous section, contribute to a more nuanced understanding of how, what, and why vocational teachers learn. Four key contributions to the body of knowledge about vocational teachers' CPD emerge from these findings. In the following sections, these contributions are discussed.

Specifying the situatedness of vocational teachers' CPD

A key contribution of this dissertation to the body of knowledge on professional development of teachers, lies in showing *how* vocational teachers' CPD takes shape within the daily practice of teaching in vocational education. Drawing on a sociocultural perspective, the research views CPD as a situated process, part of teachers' daily practice, that emerges through interactions with others and is embedded in the contexts in which the vocational teachers participate (Lave & Wenger, 1991; Leontiev, 1978). When CPD is viewed from this sociocultural perspective, distinct characteristics of vocational teachers' CPD become visible, characteristics that are strongly shaped by the specific nature and practices of teaching in vocational education. Such insights into the nature of teachers' CPD are still scarce, specifically for experienced teachers in vocational education. In this sense, the research in this dissertation adds to existing literature, which predominantly focuses on CPD in primary and secondary education settings (e.g. De Jong et al., 2025; Van Tartwijk et al., 2023; Wess et al., 2023).

The findings in this dissertation show that teachers' CPD in vocational education is not confined to traditional educational settings such as classrooms or teacher-student interactions. For example, educational programmes often take place partly in workplace settings, which requires teachers to collaborate with workplace educators. At the same time, teachers prepare students for vocational practice, which means teachers need a deep understanding of that practice to ensure their teaching remains relevant and meaningful (Bükki & Fehérvári, 2024). Because vocational teaching is closely intertwined with the vocational fields which students are educated for (Andersson & Köpsén, 2018), teachers' CPD is embedded in their broad, multifaceted daily practice of this dual form of education. This encompasses learning within and beyond the school (Bruijn et al., 2017; De Vos et al., 2019), as the teaching practice in vocational education includes interactions with professionals in the vocational field, students' workplace learning environments, professional networks, and external experts (Antera, 2021; Smith & Yasukawa, 2017).

In addition to vocational education being partly embedded in vocational practice itself, all studies in this dissertation show that teaching and teachers' professional development

in vocational education are strongly connected to the ongoing process of designing and re-design of educational programmes relevant for the (future) vocational field of their students, as well as to collaboration at operational, tactical, and strategic levels, both in and beyond school and in vocational practice (Lambriex-Schmitz et al., 2020; Vreuls et al., 2023; Zhou et al., 2022). By taking a broad perspective on the teaching vocation, the results showed a combination of engagement with vocational practice, curriculum renewal, and collaboration with diverse stakeholders across multiple levels. These distinguishing characteristics of the situatedness of teachers' CPD appear to be particularly salient in vocational education, although comparable characteristics may also occur in other educational sectors (e.g. primary and secondary education), such as teachers collaborating within communities, contributing to curriculum development, or engaging in teacher-researcher activities, yet these broader aspects are less often studied (e.g. Anderson & Taner, 2023; Hoekstra et al., 2007).

The value of both formal and informal professional activities in teachers' CPD

The dissertation highlights that vocational teachers' CPD is shaped by a combination of formal and informal professional development activities (Bükki & Fehérvári, 2024; Haemer et al., 2017; Lecat et al., 2019; Wijga et al., 2025). **Chapter 2** shows that, similar to the CPD of teachers in other sectors, informal learning plays a significant role in vocational teachers' CPD. Informal learning often emerges in everyday practice, while formal activities likewise contribute to their development (Ballangrud & Nilsen, 2021). Both forms of learning seem relevant for teachers' CPD in vocational education and are mutually enriching; they are not opposites. In line with other researchers (e.g. Gairín Sallán et al., 2022; Kyndt et al., 2016; Spaan et al., 2016; Wijga et al., 2025) CPD can be understood, as a variety of activities, where formal and informal professional development activities complement and reinforce each other.

By exploring how teachers engage in everyday learning and how learning occurs across various settings in teachers' daily work, this dissertation offers a perspective that moves beyond the dichotomous framing of professional development activities (Van der Baan et al., 2024; Webster-Wright, 2009). The findings of **Chapter 3** show that each teacher engages in a variety of activities of formal and informal activities in a unique way, placing different emphases on types of activities related to what teachers need, find meaningful, and what motivates them in their work. This variety in the (combinations of) activities teachers undertake implies that eliciting professional development by means of programmes or training cannot be easily standardised, but benefits from being tailored to individual preferences and contexts (Tapani & Salonen, 2019).

Acknowledging the value of both formal and informal professional development activities, allows for more flexible, context-sensitive approaches for stimulating vocational

teachers' CPD that resonates with the realities of teaching in vocational education. While prior research on learning of professionals in other domains has established the importance of both formal and informal activities (Froehlich et al., 2023; Lejeune et al., 2023), the findings revealed in this dissertation show how the variety of these activities enriches teachers' professional development in vocational education. The typification of formal and informal activities (**Chapter 2**) and the combination of these activities depending on teachers' work and orientations (**Chapter 3**) offer a framework for understanding vocational teachers' CPD. Rather than serving as a normative guide, this framework provides language to articulate the variety of professional development activities teachers undertake and shows how this variety is shaped differently across different groups of vocational teachers.

Professional orientations as a lens for understanding diverse teacher CPD

This dissertation introduces *professional orientations*, reflected in three CPD profiles, as a lens to understand the diversity in vocational teachers' professional development. Rather than assuming CPD is of a uniform nature, the findings show that teachers differ in how they view their vocation, perceive their learning needs, and how they wish to contribute to the quality of vocational education (**Chapter 3-5**).

The findings show that professional orientations, as reflected in the CPD profiles, vary from teacher to teacher and highlight that experienced vocational teachers have distinct learning foci (**Chapter 3 and 5**). This dissertation confirms that, consistent with Karlberg and Bezzina (2022), that all vocational teachers continue to focus on improving their teaching, although the findings in the dissertation show that the extent to which this focus occupies a central place within their professional orientation varies. For example, in contrast to teachers in profiles 2 and 3, teachers in profile 1 (**Chapter 3**), labelled as 'teaching-and-innovation' oriented (**Chapter 5**), primarily focus on refining their teaching strategies and interactions with students, both in the classroom and through deliberate experimentation. Teachers in profile 2 (**Chapter 3**), labelled as 'reflection-and-collaboration' oriented (**Chapter 5**), concentrate more on reflecting on their teaching practice within their teacher teams, for instance by observing student-teachers' lessons or coordinating excursions abroad. They also take on tasks and roles at the tactical level of the school, extending their professional focus beyond core teaching and student-teacher interactions. Teachers in profile 3 (**Chapter 3**), labelled as 'strategic-and-career' oriented (**Chapter 5**), devote less attention to teaching and coaching, although they connect insights and methods gained outside the school to potential benefits for teaching strategies and students' interactions, such as theoretical models and collaborative practices. The professional development of teachers in profile 3 is strongly linked to external professional communities and networks, positioning their work at a more strategic level both within and beyond the school. The CPD profiles (**Chapter 3**), and the rich illustrations of

how CPD unfolds in practice provided by the teacher narratives (**Chapter 5**), together offer an integrated framework for understanding vocational teachers' CPD.

The three distinct professional orientations underscore the need to take into account teachers' own professional agendas in eliciting professional development (Bükki & Fehérvári, 2024). Learning that stems from teachers' own needs is important for several reasons: it enhances intrinsic motivation when teachers themselves recognise the need for change (Jansen in de Wal et al., 2014), it supports their self-directed learning and development (Merriam, 2018), and it aligns with experience-based learning where teachers are best positioned to identify their own challenges (Van Veen et al., 2012). However, teachers' CPD needs should not remain isolated. Ideally, teachers' CPD is aligned with the shared ambitions and goals of teacher teams and the school as a whole (Mihai et al., 2025). This alignment underscores the collective nature of vocational education, in which CPD is strengthened through collaborative practices within teacher teams (Bouwman et al., 2019a; Karlberg & Bezzina, 2022; Koeslag-Kreunen et al., 2021; Pinheiro et al., 2023).

A multi-perspective approach for studying teachers' CPD

Aligned with the sociocultural view on CPD as embedded in practice, this dissertation employed a multi-perspective approach to capture the CPD of vocational teachers, combining variable-centred and person-centred approaches to investigate CPD. Whereas existing research often focus on specific variables (or factors or conditions) in the learning of teachers (e.g. Cattaneo et al., 2025; Kyndt et al., 2018; Loughland & Ryan, 2020; Van den Bergh et al., 2014; Van Veen et al., 2012), this dissertation combines such variable-centred approaches with research approaches that make individual differences between teachers visible (Vanthournout et al., 2013). Combining variable-centred with person-centred approaches resonates with a growing trend in educational research to study individual combinations of variables and learning as a coherent whole of interrelated variables within personal profiles (Vanthournout et al., 2013; Haarala-Muhonen et al., 2017; Koopman & Beijaard, 2024). The research presented in this dissertation started with variable-centred approaches that aided in identifying professional development activities (**Chapter 2**) and learning outcomes and contributing factors (**Chapters 3 and 4**). Next, person-centred approaches were added (**Chapter 3 and 5**), zooming in on how these variables relate to one another at the individual level in recognisable patterns of CPD. The combination of variable-centred and person-centred approaches makes it possible to identify not only relationships between variables but also how these variables, namely activities, learning outcomes, and contributing factors, interact for (clusters of) individual teachers (Koopman & Beijaard, 2024; Vermunt & Donche, 2017). The person-centred approach described in **Chapter 3** reveals profiles of CPD that would otherwise remain invisible in variable-centred studies. The person-centred approach described in **Chapter 5** made it possible to illustrate how specific combinations of informal and formal development activities and collaborative practices co-occur with particular learning outcomes and contributing

factors within individual teachers. Together these approaches reveal a complementary picture, that highlights the complexity and individuality of CPD and do justice to individual orientations (Haarala-Muhonen et al., 2017.; Vermunt & Donche, 2017).

Placing the teacher as a person at the centre of the analysis (**Chapter 3 and 5**) contributes to a practice-oriented understanding of CPD (Jansen in de Wal et al., 2014). The person-centred approach facilitates insight into how teachers develop, and it offers a bridge between academic educational research and everyday educational practice. By telling teachers' stories in a rich and contextualised manner, these narratives (**Chapter 5**) provide insight into how, what, and why teachers learn in their daily work (Karaman & Edling, 2021; Taylor, 2017). They also offer a person-centred framework that can inspire other teachers to reflect on and articulate their own CPD.

Applying the logic of combining variable-centred and person-centred approaches to studying teachers' CPD is still rare in the field (Vermunt & Donche, 2017; Yang et al., 2025). The qualitative clustering techniques used in **Chapter 3** demonstrate how variables identified in analyses can be meaningfully combined into coherent profiles through systematic clustering procedures (Norusis, 2010). Such techniques contribute to research on CPD (Kusurkar et al., 2021) and expand the methodological repertoire of researchers with tools to analyse patterns across teachers in a nuanced and person-oriented way. This allows researchers to capture the diversity and complexity of teachers' CPD, and reveal how combinations of activities, learning outcomes and factors come together in distinct profiles. Combining variable-centred and person-centred approaches therefore supports the development of context-sensitive research designs and encourages further methodological innovation in the study of teacher professional development.

METHODOLOGICAL REFLECTION

This section outlines the strategies employed to ensure the quality of the research in this dissertation. Methodological quality is understood in terms of acceptability (Akkerman et al., 2008; De Kleijn & Van Leeuwen, 2018), which entails that decisions about research design and analyses are acceptable according to the norms and standards, in this case of educational research into teacher professional learning. Pre-conditional for acceptability are the quality criteria of comprehensibility, which implies that decisions are substantiated, and visibility (Akkerman et al., 2008). Visibility is enhanced when researchers make explicit and transparent how the results were established and communicate their chain of evidence (De Kleijn & Van Leeuwen, 2018; Guba & Lincoln, 1985). Based on this understanding of methodological quality, five measures were taken to strengthen the quality of the research presented in this dissertation.

First, the research design of this dissertation is characterised by its longitudinal data collection, which is noteworthy as such designs are still scarce in research on teachers' CPD, especially in vocational education (Antera, 2022). This measure was taken to assure acceptability. Over a period of three years, vocational teachers were studied repeatedly using multiple methods, including learner reports, interviews, and concept maps. To create a more in-depth understanding of vocational teachers' CPD measurements were combined. For example, during interviews, activities described in the learning reports were discussed. The longitudinal data collection provides insights into CPD patterns and relationships between activities, learning outcomes, and contributing factors (**Chapter 3 and 5**). With repeated measurements, the data can be considered a series of 'snapshots' similar to how individual pixels in a painting gradually reveal the whole picture. Nevertheless, the dissertation may not fully capture the sequences of activities and not present the temporal order of professional development activities (e.g. Leeferink et al., 2019). Further research could build on this by systematically tracing individual development processes over time, applying a longitudinal approach that explicitly maps the sequences and inter-relations of learning experiences.

Second, prior to data collection, a full year was dedicated to systematically developing and refining the research instruments through multiple pilot phases. This process contributed to the quality criterion of comprehensibility. Given that the study relied solely on qualitative self-reported data, this extensive piloting was essential for enhancing quality and ensuring that the instruments captured nuanced insights into CPD of vocational teachers (Poortman & Schildkamp, 2012). Each of the three instruments, learner reports (**Chapter 2 and 3**), semi-structured interviews (**Chapter 3**), and concept maps with member-check interviews (**Chapter 4**), was piloted in several stages involving both teachers and experts. For example, piloting the learner reports and semi-structured interviews (**Chapter 2 and 3**), helped refine the formulation of questions to make them suitable for vocational teachers and adjust the sequencing of topics for better flow. Similarly, the concept map procedure (**Chapter 4**) was piloted to make the BrainWeaver software user-friendly, to determine which types of prompts elicited the most meaningful responses and adjust the member-check interviews to contribute to the quality of the concept maps effectively. These refinements contributed to the quality of the data. In Appendix D and Appendix J, this intensive and iterative process of piloting is displayed, which contributed to the quality criterion of visibility.

Third, to transcend the specificity of one domain (Cohen et al., 2002), the research in this dissertation was conducted in two vocational domains in the Dutch context with 26 experienced vocational teachers from five vocational schools. This contributed to the quality criterion of acceptability. While the sample size and scope are limited, which restricts the generalisability of the findings, they provide valuable insights.

Fourth, following vocational teachers over three years required continuous reflection on the author's dual role as researcher and professional insider (Semjonova, 2023). The author's insider position derives from prior professional experience in vocational education, including familiarity with teaching practices, school contexts, and the professional challenges faced by teachers. The proximity of the researcher had clear advantages in the research. For example, it enabled the researcher to ask more relevant questions during interviews, encourage participants to continue participating in the studies, and interpret data with a richer understanding of teachers' contexts. These aspects of the researcher's insider perspective contributed to the depth and quality of the data. At the same time, close involvement in the practice of teaching introduced dilemmas related to the quality criterion of acceptability. Relational dynamics could influence responses, and maintaining objectivity was a constant concern (Michels et al., 2024; Tong et al., 2007). To manage these risks and related to the quality criterion of visibility, the research team engaged in ongoing reflexive dialogue, documented decisions, and critically reviewed interpretations throughout the research, further described in the next section. This approach supported the research team in remaining critical awareness of the dual role and ensured that the benefits of proximity were balanced against potential bias, acknowledging the researcher's position as an unintended interventionist (Bronkhorst, 2013)

Finally, to address the quality of the analysis process itself, multiple strategies were aimed at ensuring the acceptability, comprehensibility, and visibility of the research (Akkerman et al., 2008). (a) All analytic steps were documented in detailed research logs, which served as an audit trail and allowed the research team to review and challenge decisions. These logs enhanced transparency, made the process traceable, and thus allowed others to assess the acceptability of the process. The iterative analysis cycles, in which both other researchers and practitioners were involved, further strengthened and refined the analytical process. (b) Regular reflexive discussions within the research team contributed to the development of robust instruments that enabled for collecting relevant and rich data. Acceptability was further supported through (c) operationalisation of key variables, such as activities, learning outcomes and contributing factors, and using multiple instruments based on established literature (Thurlings & Den Brok, 2017) which strengthened the design. (d) Inter-rater reliability was calculated during key coding phases to check consistency, for example in **Chapter 2**, where part of the data was analysed separately by two researchers and inter-rater reliability was established. Acceptability was supported through (e) member-checking to validate interpretations with participants (**Chapter 4 and 5**). Additionally, visibility was enhanced by adding (f) representative quotes to illustrate findings and ensuring that interpretations were grounded in the data. Together, these measures addressed the inherent challenges of qualitative research conducted over an extended period of time.

IMPLICATIONS FOR FURTHER RESEARCH

The findings of this dissertation open several promising directions for further research, building on the insights gained into the CPD experienced vocational teachers from their own perspectives. A first suggestion for further research is to include the perspectives of vocational students and professionals from vocational practice, as this could enrich our understanding of teachers' CPD. Their voices could reveal how vocational teachers' CPD translates into their teaching practice across different settings and how it impacts student learning. Vocational students and professionals may offer valuable views and feedback on what vocational teachers should learn, providing an additional perspective on teachers' professional development. Their insights could therefore complement teachers' own perspectives and contribute to our understanding of how professional development is perceived, enacted, and experienced across contexts in vocational education.

While this dissertation focused on activities, learning outcomes, and contributing factors, professional identity (Beijaard et al., 2004; Canrinus et al., 2018; Vähäsantanen et al., 2008) was not part of the scope of this dissertation. A promising direction for future research is to adopt professional identity as a lens for further understanding vocational teachers' CPD, as learning is closely linked to teachers' identity, encompassing both their professional and personal selves. Vocational teachers work at the intersection of education and the vocational field, often integrating aspects of a prior professional identity from their previous career into their teaching role (Köpsén, 2014; Tyler & Dymock, 2021; Van Renselaar et al., 2025). Exploring how dual or interprofessional identities (Antera & Teräs, 2024; Tong et al., 2025) shape vocational teachers' CPD would deepen our understanding of teachers' development and the identity tensions they experience.

The dissertation introduced three professional profiles (**Chapter 3 and 5**) that reflect different orientations toward teachers' work and their learning. Future research could examine how these profiles evolve over time in response to changing roles, ambitions, and institutional contexts (Pedder & Opfer, 2013). Longitudinal comparative studies could also explore whether similar profiles exist in other educational sectors, providing insights into professional orientation across sectors.

This dissertation followed the CPD of individual experienced vocational teachers over three years to gain insight into their activities, learning outcomes, and contributing factors. The qualitative design revealed how these aspects are interconnected, forming a coherent whole that shapes vocational teachers' CPD. By examining the CPD profiles of vocational teachers (**Chapter 3 and 5**), an initial step was taken towards linking teachers' CPD to personal goals, motivations, and career development and even team ambitions. These connections, however, call for further and more explicit investigation. Future research could investigate how such goals and ambitions align with or conflict

with professional development as enacted in practice (Kunst et al., 2018; Louws et al., 2017; Van Woerkom et al., 2024). One way to achieve this is to incorporate these topics into research designs on teachers' CPD, for example by examining individual goals, team ambitions, or career plans and how these relate to teachers' CPD. Such research may provide a more comprehensive understanding of the role of goals and motivation within person-oriented profiles (Koopman & Beijaard, 2024).

The dissertation offers valuable insights into experienced vocational teachers' CPD, primarily from their own perspective. However, the reliance on self-reported data introduces limitations: responses may reflect perceptions, 'what they think they know and do', rather than actual actions of teachers and can be influenced by biases such as social desirability (Baier-Mosch et al., 2024; Decuyper et al., 2025). To address this issue, it would be helpful to also use other data collection methods, such as observational data, in future research (De Bruijn & Leeman, 2011; Thurlings & Den Brok, 2017). This would contribute to gaining more insight into the impact of vocational teachers' CPD on student learning.

Finally, this dissertation focused on the CPD of individual experienced vocational teachers. Future research could place greater emphasis on professional development of teacher teams. In vocational education, this includes not only teacher teams but also extended teams involving colleagues, teacher educators and professionals from vocational practice. Future studies could examine how teachers' CPD unfolds within these teams and how it aligns with their collective ambitions, as well as how collective professional development takes shape in vocational education (Van Woerkom et al., 2024). For instance, investigating interaction patterns (Emans et al., 2025) and how ownership for collective learning emerges in teacher teams (Kyza & Georgiou, 2025) would deepen our understanding of CPD as a social and collective endeavour (Nijland & Vermeulen, 2025).

IMPLICATIONS FOR PRACTICE

This research offers several practical implications for strengthening vocational teachers' professional development. The implications are relevant for various stakeholders in vocational education, such as teachers themselves, school leaders, policymakers, HR advisors, educational consultants, and teacher educators.

Enhance the learning potential of the workplace for vocational teachers

The findings in this dissertation call for a shift in how professional development is supported in vocational education, namely by enhancing the learning potential of the workplace rather than focusing primarily on organizing formal professional development activities. This means creating more opportunities for learning during and from teachers'

daily work. Not only by organising activities, but also by adding and strengthening opportunities for learning and encouraging teachers to make use of the opportunities that already exist in their daily work (Ceelen et al., 2023).

For schools, there are considerable quick wins when it comes to fostering teachers' CPD in their daily practice. Learning can be promoted through approaches such as facilitating co-teaching and encouraging teachers to participate in innovation projects and professional networks within and beyond the school, particularly together with professionals from vocational practice. Learning can also be fostered through shared leadership within teacher teams, for example, by providing opportunities for teachers to take on new tasks and roles. In addition, schools could empower colleagues who already play a key role in professional development within schools to stimulate vocational teachers' CPD, such as teacher leaders or teacher educators. This involves not only recognising and utilising their expertise but also engaging them in supporting both novice and experienced teachers, for example by providing feedback on classroom practice and fostering reflective practice. Such measures can create opportunities for teachers' professional development and promote more explicit reflection on teachers' learning, without the need for large-scale interventions.

In addition, schools can foster both formal and informal learning by supporting participation in professional learning communities (PLC's), such as Lesson Study (Agricola et al., 2022), communities of inquiry (COIs) (Willemse et al., 2016), or communities of practice (COPs) (Wenger et al., 2011). Such communities exemplify how formal and informal learning can be connected and how learning can be linked to shared goals and broader school development. These communities formally structure collaboration but also trigger rich informal learning through dialogue, research, and joint problem-solving.

Instead of having teachers participate in prescribed and uniform trajectories, schools should explore ways to support teachers integrate formal and informal learning. This includes explicitly making use of the factors that contribute to professional development and continuously aligning organised formal activities with the informal learning that occurs in teachers' daily practice in vocational education. For example, one school in this research organised 'cross-disciplinary dialogue groups', in which teachers from different domains meet regularly to discuss shared learning themes, guided by a moderator and an expert. Another initiative, 'innovation labs', brings together teachers, students and professionals from vocational practice to co-develop educational programmes and experiment with lessons, for example, lessons that incorporate immersive technologies. These activities create formal spaces that naturally foster informal learning by alignment with teachers' practices, encouraging collective and active participation, supporting personal interests, and promoting reflection, thus illustrating how schools can innovate in professional development.

Use professional orientations, teachers' knowledge, and narratives as lens for dialogue

The findings in the dissertation provide insight into how teachers perceive their vocation and what they consider important (**Chapter 4**), as well as how they shape their CPD (**Chapter 2, 3 and 5**). The professional orientations (profiles) described in **Chapter 3**, the identified themes shaping teachers' knowledge described in **Chapter 4**, and the narratives of teachers' CPD described in **Chapter 5** also hold practical value. These findings may provide a useful lens for dialogue among vocational teachers, helping to explore how, what, and why teachers (want to) learn in their daily practice. The described profiles, the themes, and the narratives provide language and structure to make differences between teachers' CPD visible, stimulate to broaden their views on their CPD, and stimulate possible career paths. Stimulating ongoing conversations about teacher' CPD within teacher teams may help teachers become better equipped to approach, manage, and pursue their own learning, assess how their learning is supported, and foster ownership of collective professional development within their teacher team (Eraut, 1994). From this perspective, dialogue within teacher teams could play a key role in shaping professional development, creating opportunities for shared sense-making on *good work*, as part of the continuous process of striving for educational quality, and for learning that is embedded in daily practice (Ruijters & Simons, 2020).

Co-design and customise the opportunities for professional development in teacher teams

Inspired by the findings in the dissertation, schools can encourage teachers to co-design and tailor professional development opportunities collaboratively, rather than prescribing fixed programmes, ensuring that ownership of CPD does not rest solely with school leaders, policymakers, or human resource advisors. This requires explicit attention to the full scope of the teaching vocation (**Chapter 4**) and vocational teachers' diverse professional orientations (**Chapter 3 and 5**). Vocational teachers operate in roles that span both school and vocational practices, across multiple educational levels, range from classroom teaching to curriculum development, and may include school-wide responsibilities, and even engagement with national policy. Professional development opportunities should reflect this breadth and be collaboratively shaped within teacher teams. For example, while some teachers in a teacher team may wish to deepen their pedagogical practice, others may focus on curriculum innovation, industry collaboration, mentoring roles, or policy involvement. This also necessitates customised opportunities for CPD that align with individual motivations and ambitions as well as school goals (Rice et al., 2024). Alignment of professional development needs between individual teachers and teacher teams could be addressed through, for example, development conversations, performance reviews, teacher team meetings, or policy-making processes.

Supporting variety and tailored opportunities in CPD of teachers in vocational education is essential, not only for maintaining the quality and relevance of vocational education

(Zhou et al., 2022), but also for retaining teachers and preventing attrition (Rice et al., 2024; Snoek et al., 2019; Van Renselaar et al., 2025). As Ovenden-Hope et al. (2018) argue, ample opportunities for professional development tailored to individual needs are a key factor in reducing teacher attrition and increasing the attractiveness of the teaching vocation. Importantly, the findings of this dissertation demonstrate that vocational teachers develop professionally through both formal and informal professional development activities, with different foci. In the Dutch context, teachers have considerable autonomy in how they use their professionalisation time, yet school leaders, human resource advisors and policymakers often seem to focus solely on formal type of activities. This discrepancy highlights a critical area for attention and underscores the need to co-create rich, varied leaning opportunities that extend beyond traditional, one-size-fits-all approaches.

Enhance the connection with vocational practice in vocational teachers' CPD

This research shows that vocational teachers' CPD is closely linked to vocational practice for which teachers educate their students, although the role of vocational practice is less prominent in vocational teachers' CPD than might be expected. Teaching in vocational education inherently requires engagement with both school and vocational practice (Andersson et al., 2018). This dual connection reflects the nature of vocational education, where vocational programmes partly take place in workplace settings which requires teachers to collaborate with workplace practitioners. Moreover, teachers are required to understand the vocational practice to ensure students' learning remains relevant and meaningful (Andersson & Köpsén, 2019). Schools can strengthen vocational teachers' CPD by creating opportunities to learn with and from vocational practice, for example through internships, joint projects, or participation in networks that connect education and the occupational field. Such collaborative initiatives help teachers maintain up-to-date vocational knowledge and deepen their understanding of the vocation for which they are preparing their students.

CONCLUSION

This dissertation demonstrates that the CPD of experienced vocational teachers is not a uniform process, but a diverse, situated, and personal one, unfolding in and around the dynamic and multifaceted daily practice of vocational education. By adopting a broad approach to the teaching vocation and studying CPD as a coherent whole of activities, learning outcomes, and contributing factors, the variety of vocational teachers' CPD becomes visible. The findings emphasise that the professional development of experienced vocational teachers requires room for variation, continuous dialogue, and tailored approaches.





S

Nederlandse samenvatting

NEDERLANDSE SAMENVATTING

Continue professionele ontwikkeling van ervaren mbo-docenten

Het middelbaar beroepsonderwijs (mbo) speelt een belangrijke rol in de voorbereiding van studenten op een betekenisvolle deelname aan de beroepspraktijk en aan bredere maatschappelijke participatie. Mbo-docenten spelen daarbij een cruciale rol door hun begeleiding van studenten (Zhou et al., 2022). Mbo-docenten worden geconfronteerd met voortdurende uitdagingen en snelle veranderingen in beroepspraktijk en onderwijs, zoals technologische ontwikkelingen, onderwijsvernieuwingen en een toenemende diversiteit in de studentenpopulatie (Bükki & Fehérvári, 2024). Mbo-docenten moeten zowel vakinhoudelijke expertise van hun beroepsdomein onderhouden als hun pedagogisch-didactische vaardigheden verder ontwikkelen. Daarnaast stromen zij vaak het onderwijs in vanuit de beroepspraktijk en vormen zij een heterogene groep wat betreft achtergrond en expertise (De Bruijn et al., 2017).

Om de relevantie en kwaliteit van het beroepsonderwijs te waarborgen, is continue professionele ontwikkeling van ervaren mbo-docenten essentieel. Ondanks hun cruciale rol zijn ervaren mbo-docenten een relatief onderbelichte groep in wetenschappelijk onderzoek en hebben we dus beperkte kennis over hoe die professionele ontwikkeling optimaal gestimuleerd kan worden. Het onderzoek in dit proefschrift richt zich op de continue professionele ontwikkeling van ervaren mbo-docenten.

Het doel van het onderzoek dat gepresenteerd wordt in dit proefschrift was om inzicht te verkrijgen in hoe ervaren mbo-docenten zich professioneel ontwikkelen: welke activiteiten ondernemen zij, tot welke leeropbrengsten leiden deze activiteiten en welke factoren ondersteunen dit leren? Deze aspecten worden in samenhang bestudeerd.

De centrale onderzoeksvraag luidt: *Hoe ontwikkelen ervaren mbo-docenten zich professioneel?* Om deze onderzoeksvraag te beantwoorden, is longitudinaal data verzameld binnen vier samenhangende empirische kwalitatieve studies. In de periode 2018-2021 zijn 26 ervaren mbo-docenten, uit de domeinen welzijn en economie en afkomstig van vijf mbo-scholen, gevolgd in hun professionele ontwikkeling.

Theoretisch perspectief op continue professionele ontwikkeling

In dit onderzoek wordt *continue professionele ontwikkeling* benadert vanuit een sociaal-cultureel perspectief op leren (Evans, 2019; Lave & Wenger, 1991). In **hoofdstuk 1** is uiteengezet dat vanuit dit perspectief professionele ontwikkeling gezien wordt als een sociaal proces dat is ingebed in de dagelijkse praktijk, waarin docenten zich voortdurend ontwikkelen door interactie met anderen en door participatie in verschillende praktijken in het mbo (Billett et al., 2018; Borko, 2004).

Jezelf verder ontwikkelen als docent is een continu proces dat plaatsvindt gedurende de gehele loopbaan. Het leren van mbo-docenten is sterk verbonden aan de praktijk van alledag. In deze dagelijkse praktijk participeren docenten individueel en samen met anderen middels allerlei *activiteiten* die het leren stimuleren en die verbonden zijn aan dat werk of aan meer georganiseerde professionaliseringsactiviteiten. Georganiseerde activiteiten, ook wel formele activiteiten genoemd, zijn doelgericht en gepland (Akiba & Liang, 2016). Denk bijvoorbeeld aan het volgen van een workshop, een training of een conferentie. De activiteiten verbonden aan het dagelijkse werk, ook wel informele activiteiten genoemd, zijn spontaan en ongepland zoals het leren van het vormgeven van onderwijs of het uitvoeren van taken (Kyndt et al., 2016). Het participeren in activiteiten in het dagelijkse werk ontlokt het leren en kan leiden tot diverse *leeropbrengsten*. Om de volle breedte van leeropbrengsten te onderzoeken, worden in dit proefschrift twee dimensies gehanteerd: (1) ervaren veranderingen in denken en doen (Bakkenes et al., 2010) en (2) door docenten geëxpliciteerde beroepskennis (Schaap et al., 2009). Dimensie 1 richt zich op veranderingen in het denken en doen van docenten, zoals nieuwe inzichten en de toepassing daarvan in de praktijk. Dimensie 2 gaat over welke kennis docenten relevant vinden voor hun beroep en werpt daarmee licht op hoe docenten de reikwijdte van hun beroepskennis beoordelen. Verschillende *factoren* kunnen bijdragen aan het leren van mbo-docenten, zoals interactie en samenwerking met anderen, actieve betrokkenheid bij reflectie en onderzoek, duidelijke leerdoelen, of persoonlijke en organisatorische condities in de werkomgeving (Van den Bergh et al., 2014; Kyndt et al., 2018).

In hoofdstuk 1 wordt uiteengezet hoe activiteiten, leeropbrengsten en factoren samen de theoretische lens vormen waarmee de continue professionele ontwikkeling van ervaren mbo-docenten is onderzocht.

Belangrijkste bevindingen per hoofdstuk

Het doel van de studie beschreven in **hoofdstuk 2** was om inzicht te verkrijgen in activiteiten die het leren van ervaren mbo-docenten stimuleren en deze activiteiten te typeren. In deze studie beschreven 26 ervaren docenten, gedurende de dataverzamelperiode (2018-2021) in zes learner reports, 386 activiteiten. Op basis van de resultaten kon een typologie van vijf formele (georganiseerde) professionaliseringsactiviteiten en zes informele activiteiten, die het leren van mbo-docenten stimuleren, worden onderscheiden. Driekwart van de beschreven activiteiten was informeel en ingebed in de dagelijkse praktijk van docenten. De activiteiten die het leren stimuleren variëren per docent en zijn sterk verbonden met het begeleiden (lesgeven en coachen) van studenten, zowel in de klas als in de beroepspraktijk, en met het aanpassen, vernieuwen en herontwerpen van beroepsgerichte curricula. Daarnaast laat deze studie zien dat mbo-docenten zich ontwikkelen door interactie en samenwerking met een grote diversiteit in actoren, zoals collega's, studenten, stakeholders uit de beroepspraktijk en professionals buiten de eigen school.

Hoofdstuk 3 beschrijft de studie die zich richtte op het karakteriseren van de continue professionele ontwikkeling van mbo-docenten in termen van activiteiten die het leren van docenten stimuleren, in relatie tot ervaren leeropbrengsten (veranderingen in denken en doen) en de factoren die bijdragen aan het leren. Voor deze studie werden de percepties van docenten verzameld via zes learner reports en twee semigestructureerde interviews per docent. Van 12 docenten was de dataset compleet, wat resulteerde in 72 learner reports en 24 semigestructureerde interviews. Op basis van de resultaten konden drie profielen worden geïdentificeerd die de continue professionele ontwikkeling van ervaren mbo-docenten karakteriseren: professionele ontwikkeling gericht op het primaire proces van het lesgeven en coachen (profiel 1), gericht op het uitvoeren van taken en rollen binnen de school (profiel 2), en gericht op de eigen positie in relatie tot de bredere context van het mbo (profiel 3). De drie profielen lijken verschillende professionele oriëntaties van ervaren mbo-docenten te weerspiegelen ten aanzien van hun werk, en daarmee hun professionele ontwikkeling. Deze oriëntaties zijn breder dan de lesgeoriënteerde benaderingen die vaak worden beschreven in literatuur over professionele ontwikkeling van docenten in het basis- en voortgezet onderwijs. De studie laat zien dat de professionele ontwikkeling van mbo-docenten zich richt op zowel het primaire onderwijsproces als op het tactische en strategische niveau van het werken in (grotere) onderwijsorganisaties, zoals het ontwikkelen van een visie op onderwijs of het implementeren van onderwijsinnovaties.

Het doel van de studie beschreven in **hoofdstuk 4** was het karakteriseren van de aard en inhoud van de beroepskennis van ervaren mbo-docenten. Gedurende de periode van 2018-2021 hebben de mbo-docenten jaarlijks een concept map geconstrueerd waarin zij hun beroepskennis hebben geëxpliciteerd. Dit resulteerde in 66 concept maps van 22 docenten. Deze concept maps zijn geanalyseerd op inhoud aan de hand van zes kenniscomponenten (kennis over de beroepsgroep, onderwijsprocessen en -procedures, sociale omgeving, organisatorische structuur, doelgroep en persoonlijke ontwikkeling) en op de aard van kennis aan de hand van vier aspecten (concreetheid, complexiteit, specificiteit en rijkheid) (Schaap et al., 2009; 2011). De resultaten laten zien dat de inhoud van de beroepskennis van deze docenten bestond uit kennis die de specifieke kenmerken van het mbo weerspiegelt, zoals kennis over het instrueren en begeleiden van studenten, de beroepspraktijk van studenten, organisatorische kennis binnen en buiten de school, en kennis over het navigeren tussen verschillende stakeholders en contexten. De dynamiek en de reikwijdte van het docentschap in het beroepsonderwijs wordt daarnaast zichtbaar in de 24 thema's die zijn geïdentificeerd binnen de zes kenniscomponenten. De studie laat zien dat de aard van de beroepskennis van docenten overwegend concreet, specifiek en complex is, maar dat de beroepskennis die docenten hebben geëxpliciteerd in hun concept maps niet gelijk verdeeld is over de kenniscomponenten (rijkheid). De bevindingen wijzen er daarnaast op dat de geëxpliciteerde kennis van de mbo-docenten het volledige spectrum van het docentschap in het beroepsonderwijs omvat, veelzijdig is

wat betreft inhoud en aard, en sterk wordt gekleurd door het specifieke beroepsdomein waarvoor docenten studenten opleiden.

De laatste studie, beschreven in **hoofdstuk 5**, illustreert de continue professionele ontwikkeling van drie ervaren mbo-docenten, waarbij iedere docent een profiel vertegenwoordigt dat in eerder onderzoek is geïdentificeerd (**hoofdstuk 3**) en die een professionele oriëntatie weerspiegelt. Om de professionele ontwikkeling van deze docenten te kunnen illustreren en te duiden, is een narratieve analyse uitgevoerd op eerder verzamelde kwalitatieve data uit de studies beschreven in **hoofdstuk 2, 3 en 4** (Polkinghorne, 1995). De analyse resulteerde in drie samenhangende narratieven: Elizabeth, als vertegenwoordiger van profiel 1 met een professionele oriëntatie gericht op *lesgeven en innovatie*; Olivia, als vertegenwoordiger van profiel 2 met een professionele oriëntatie gericht op *reflectie en samenwerking*; en Nathan, als vertegenwoordiger van profiel 3 met een professionele oriëntatie gericht op *strategie en loopbaan*. De narratieven van deze drie ervaren mbo-docenten laten zien hoe continue professionele ontwikkeling vorm krijgt in de dagelijkse praktijk en hoe de samenhang eruitziet tussen activiteiten, leeropbrengsten en factoren die bijdragen aan het leren. Activiteiten, leeropbrengsten en factoren die bijdragen aan het leren vormen daarbij een dynamisch en geïntegreerd geheel en weerspiegelen de complexiteit van de continue professionele ontwikkeling van ervaren mbo-docenten. Deze studie laat ook zien dat binnen de drie professionele oriëntaties mbo-docenten verschillende, unieke professionele en persoonlijke thema's centraal staan. Deze persoonlijk thema's benadrukken het belang van aandacht voor persoonlijke doelen, ambities, professionele leerbehoeften en motivaties van docenten in hun professionele ontwikkeling. Het erkennen van deze individuele verschillen benadrukt dat continue professionele ontwikkeling geen eenduidig proces is, maar een persoonlijk proces.

Discussie

In **hoofdstuk 6** wordt de bijdrage aan de kennis over professionele ontwikkeling van mbo-docenten beschreven. Het onderzoek in dit proefschrift laat zien *hoe* de professionele ontwikkeling van mbo-docenten ingebed is in de dagelijkse praktijk in het mbo. Door vanuit een sociaal-cultureel perspectief professionele ontwikkeling van ervaren mbo-docenten in de volle breedte van het beroep te onderzoeken, worden kenmerken van deze professionele ontwikkeling zichtbaar die specifiek zijn voor het mbo, zoals leren in en met de beroepspraktijk, samenwerking met praktijkopleiders en externe professionals, afstemming op ontwikkelingen in het werkveld, betrokkenheid bij curriculumontwikkeling en samenwerking op verschillende niveaus met diverse stakeholders. De bevindingen van dit proefschrift laten zien dat de professionele ontwikkeling van mbo-docenten niet beperkt blijft tot traditionele onderwijssettings zoals het klaslokaal of docent-studentinteracties. Deze resultaten benadrukken de veelzijdigheid van de professionele ontwikkeling van docenten in het mbo.

Daarnaast laten de studies in dit proefschrift zien dat de professionele ontwikkeling van mbo-docenten wordt gevormd door een combinatie van formele en informele activiteiten die bijdragen aan het leren (Bükki & Fehérvári, 2024). Beide vormen van leren vullen elkaar aan en versterken elkaar. Door te onderzoeken hoe docenten leren in het dagelijks werk biedt dit proefschrift een perspectief dat verder gaat dan een dichotome benadering van professionaliseringsactiviteiten in of formeel of informeel leren (Van der Baan et al., 2024; Webster-Wright, 2009). De studies laten zien dat iedere docent een unieke variëteit aan formele en informele activiteiten uitvoert. Het onderzoek in dit proefschrift benadrukt dat hoe professionele ontwikkeling van mbo-docenten bevorderd kan worden niet te standaardiseren is, maar baat heeft bij maatwerk.

Het onderzoek in dit proefschrift introduceert *professionele oriëntaties*, weergegeven in drie profielen, als lens om de diversiteit in professionele ontwikkeling van ervaren mbo-docenten te begrijpen. Docenten verschillen in hoe zij hun beroep, leerbehoeften en bijdrage aan onderwijskwaliteit zien. Docenten in profiel 1 (oriëntatie op 'lesgeven en innovatie') hebben in hun leren een focus op lesgeven en experimenteren; docenten in profiel 2 (oriëntatie op 'reflectie en samenwerking') een focus op reflectie, samenwerking en taken en rollen op tactisch niveau, en docenten in profiel 3 (oriëntatie op 'strategie en loopbaan') richten zich tijdens het leren op externe netwerken en strategische handelen. Deze professionele oriëntaties van mbo-docenten zouden echter niet op zichzelf moeten staan. Integendeel, de professionele ontwikkeling van docenten zou in wisselwerking moeten zijn met de gedeelde ambities en doelen van opleidingsteams en van de school als geheel (Mihai et al., 2025).

Tot slot brengt het onderzoek in dit proefschrift vanuit een meervoudig perspectief de professionele ontwikkeling van mbo-docenten in kaart, waarbij variabelengerichte en persoonsgerichte onderzoeksbenaderingen worden gecombineerd. Dit proefschrift start met studies met een variabelengerichte benadering die helpen bij het identificeren van activiteiten die het leren stimuleren (**hoofdstuk 2**), leeropbrengsten en factoren (**hoofdstuk 3 en 4**). Vervolgens worden persoonsgerichte benaderingen toegevoegd (**hoofdstuk 3 en 5**), waarmee wordt ingezoomd op hoe deze variabelen zich op individueel niveau tot elkaar verhouden in herkenbare patronen (profielen). De combinatie van variabelengerichte en persoonsgerichte benaderingen maakt het mogelijk om zicht te krijgen op hoe bepaalde variabelen zich manifesteren voor mbo-docenten en ook inzicht te krijgen in hoe deze variabelen – namelijk activiteiten, leeropbrengsten en factoren – in samenhang functioneren voor (clusters van) individuele docenten (Koopman & Beijaard, 2024; Vermunt & Donche, 2017). Gezamenlijk leveren deze benaderingen een complementair beeld op dat recht doet aan de complexiteit en individualiteit van professionele ontwikkeling en aan verschillende professionele oriëntaties (Haarala-Muhonen et al., 2017; Vermunt & Donche, 2017).

Aanbevelingen voor vervolgonderzoek

In **hoofdstuk 6** is ook beschreven welke aanknopingspunten de bevindingen van de studies in dit proefschrift bieden voor vervolgonderzoek naar professionele ontwikkeling van mbo-docenten. Hieronder zijn een drietal aanknopingspunten uitgelicht.

- *De stem van mbo-studenten en praktijkprofessionals*: Het betrekken van de stem van mbo-studenten en professionals uit de beroepspraktijk bij onderzoek naar professionele ontwikkeling van docenten kan meer inzicht geven in hoe professionalisering zich vertaalt naar de onderwijspraktijk. Tevens kan het inzicht geven in welke doorwerking het leren van mbo-docenten heeft op leren van studenten en welke competenties docenten volgens studenten en professionals uit de beroepspraktijk verder zouden moeten ontwikkelen.
- *Verandering van profielen door de tijd*: Vervolgonderzoek zou zich kunnen richten op hoe de drie geïdentificeerde profielen zich verder ontwikkelen door de tijd beïnvloed door bijvoorbeeld veranderingen in rollen, ambities en schoolcontexten. Ook zou vergelijkend onderzoek binnen andere onderwijssectoren, bijvoorbeeld primair of voortgezet onderwijs, zicht kunnen geven op de breedte en generaliseerbaarheid van de profielen.
- *Verbinden van doelen, motivatie en professionele ontwikkeling*: Door de profielen van mbo-docenten te analyseren (**hoofdstuk 3 en 5**) is een eerste verbinding gelegd tussen professionele ontwikkeling, persoonlijke doelen, motivaties en mogelijke teamambities. Deze samenhang vraagt om verder onderzoek. Toekomstige studies kunnen onderzoeken hoe individuele, collectieve doelen en loopbaanambities zich verhouden tot de professionele ontwikkeling van docenten in de praktijk.

Aanbevelingen voor de onderwijspraktijk

Tot slot bespreekt **hoofdstuk 6** de aanbevelingen voor de praktijk om de professionele ontwikkeling van ervaren mbo-docenten te versterken op basis van de inzichten uit het promotieonderzoek. De aanbevelingen zijn relevant voor verschillende betrokkenen in het mbo, zoals de docenten zelf, schoolleiders, beleidsmakers, HR-adviseurs, onderwijsadviseurs en opleiders. Ten eerste, benadrukken de bevindingen van dit proefschrift dat professionele ontwikkeling van mbo-docenten sterker kan worden ondersteund door het leerpotentieel van de werkplek te benutten. Dit betekent het benutten van het "laaghangend fruit" en het creëren van meer mogelijkheden om te leren tijdens en vanuit de dagelijkse werkzaamheden, zoals door co-teaching, deelname aan innovatieprojecten en netwerken met professionals uit de praktijk. Scholen kunnen daarnaast collega's met een sleutelrol in professionalisering inzetten om reflectie en kennisdeling nog meer te stimuleren, zoals teacher-leaders en schoolopleiders. Scholen kunnen ook het formele en informele leren ondersteunen door het stimuleren van participeren in bijvoorbeeld leergemeenschappen.

Ten tweede kunnen de professionele oriëntaties (profielen) (**hoofdstuk 3**), de thema's die de beroepskennis van docenten kenmerken (**hoofdstuk 4**), en de narratieven over de professionele ontwikkeling van mbo-docenten (**hoofdstuk 5**) een waardevol en nuttig kader bieden voor dialoog tussen mbo-docenten over professionele ontwikkeling. Dit kan docenten helpen te onderzoeken hoe, wat en waardoor zij in hun dagelijkse praktijk (willen) leren. Vanuit dit perspectief kan dialoog binnen docententeams een sleutelrol spelen in het meer op maat stimuleren van professionele ontwikkeling.

Ten derde zouden scholen professionele ontwikkeling beter kunnen laten aansluiten bij de manier waarop mbo-docenten (willen) leren door docenten te betrekken bij het maken van keuzes en het ontwerpen van docentprofessionalisering. Aandacht voor professionele ontwikkeling tijdens ontwikkelgesprekken en teamdialoog kunnen helpen om individuele en collectieve leerbehoeften met elkaar te verbinden en meer maatwerk mogelijk te maken.

Tot slot laat het onderzoek in dit proefschrift zien dat professionele ontwikkeling van mbo-docenten nauw verbonden is met de beroepspraktijk, maar deze verbinding sterker kan. Door structurele interacties met het werkveld te organiseren en te integreren met activiteiten die professionele ontwikkeling van mbo-docenten stimuleren, kunnen scholen de aansluiting tussen onderwijs en praktijk versterken, de relevantie van het onderwijs vergroten en de ontwikkeling van docenten verdiepen. Bijvoorbeeld door het omarmen van docentenstages, gezamenlijke (professionaliserings)projecten of netwerkbijeenkomsten.

Conclusie

Dit proefschrift laat zien dat de continue professionele ontwikkeling van ervaren mbo-docenten geen uniform proces is, maar een divers, gesitueerd en persoonlijk proces dat zich afspeelt in en rondom de dynamische en veelzijdige dagelijkse praktijk van het mbo. Door professionele ontwikkeling breed te benaderen en als een samenhangend geheel van activiteiten, leeropbrengsten en factoren, wordt zichtbaar hoe gevarieerd en betekenisvol het leren van mbo-docenten is. De resultaten benadrukken dat het bevorderen van professionele ontwikkeling van ervaren mbo-docenten vraagt om ruimte voor variatie, dialoog en maatwerk.





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A

Appendices

Appendix A. Overview of participants (Chapter 1).

School	Alias	Teaching domain	Teaching experience (years, in 2018)	Participants per chapter			
				Chapter 2	Chapter 3	Chapter 4	Chapter 5
1	Amber	Welfare	12	x		x	
1	Bobby	Business	12	x			x
1	Bernadina	Welfare	18	x			
1	Donna	Welfare	9	x	x	x	
1	Elizabeth	Welfare	15	x	x	x	x
1	Elmira	Welfare	12	x			
1	George	Business	11	x		x	
1	Jayden	Welfare	11	x		x	
1	Jack	Welfare	17	x		x	
1	Matthew	Business	16	x	x	x	
1	Maryam	Welfare	18	x	x	x	
1	Uma	Business	5	x	x	x	
2	Ben	Welfare	15	x	x		
2	Jane	Welfare	15	x		x	
2	Kameron	Business	7	x	x	x	
2	Kay	Business	11	x	x	x	
2	Rania	Welfare	5	x			
3	Jacques	Business	5	x		x	
3	Monica	Business	8	x		x	
3	Nathan	Business	6	x	x	x	x
3	Olivia	Welfare	18	x	x	x	x
3	Shanon	Business	8	x	x	x	
4	Gemma	Welfare	5	x		x	
4	Harish	Welfare	10	x		x	
4	Katie	Welfare	12	x	x	x	
5	Emine	Business	11	x		x	
			Average: 11 years				

Appendix B. Guideline for the learner report (Chapter 2).

<i>Section</i>	<i>Question</i>
1) Stimulating and inventory	What have you done in the past six to eight weeks or which situations have you experienced in the context of your professionalisation or your development as a vocational teacher?
2) Selecting learning and useful situations	Select one to five situations from those mentioned in question 1 that you found useful or encouraged you to learn. Give these situations a short title.
3) Description of the situations	Describe the situation(s) as clearly and specifically as possible. <ul style="list-style-type: none">• What was the situation and what was it about?• What was the cause and aim of the situation (if any)?• Who were present and involved in the situation? What were their roles and positions?• What did you do in this situation? Did you intend to learn in this situation beforehand? Who initiated the situation? Where did the situation take place?

Appendix C. Professional development activities of vocational teachers (Chapter 2).

Type	Subtype	Description and examples
Informal development activities	Teaching	Carrying out planned lessons and curriculum activities. For example: differentiating within the lesson based on student aptitude, changing over to online lessons or teaching adult students.
	Co-teaching	Carrying out planned curriculum activities with one or more colleagues or a guest lecturer. For example: teaching together with a vocational practitioner.
	Co-preparing	Preparing and organising curriculum activities (lessons), tests and exams together with a colleague. These colleagues can be from the own school of the vocational teacher, but also from other schools and the professional practice. For example: preparing a curriculum project together with a colleague, developing a nationwide practical exam together with colleagues from other vocational schools.
	Coaching and mentoring students in school	Planned coaching, guiding and mentoring of student(s) in school. Sometimes in the presence of parents or in presence of other professionals such as social workers, external coaches or student counsellors. For example: conversation with a student about his progress in school.
	Coaching and mentoring students during workplace learning in vocational practice	Planned coaching, guiding and mentoring of student(s) in the context of workplace learning in vocational practice. Usually in the presence of the internship supervisor. Assessments can be part of this. For example: a meeting to evaluate an internship in vocational practice together with a student and a vocational supervisor.
	Examining students' work	Viewing, assessing, reading, and checking students' work. On paper or digitally. For example: assessing students' work together with a colleague from higher vocational education in the context of a joint project.
	Co-assessing	Assessing at school or in vocational practice. Multiple assessors may be present, for example the vocational supervisor. The teacher is assessor. For example: assessing students' presentations during a vocational internship.

Appendix C. Professional development activities of vocational teachers (Chapter 2). (continued)

Type	Subtype	Description and examples
Interaction, discussion, collaboration, and sharing with others	Excursion/field trip	Scheduled field trip outside the school context with students and colleagues. For example: a field trip to a company in the Business domain.
	Interacting/collaborating/discussing/sharing with colleagues	Interacting/collaborating/discussing/exchanging knowledge, views, ideas, and expertise with colleagues within school, (or staff, other vocational schools) in team meetings, projects, and more spontaneously in informal meetings. For example: team meeting, discussion about students, meeting with teachers with a specific task, daily start of the day with the team, conversation with colleagues in the teachers' room.
	Interacting/collaborating/discussing/sharing with the vocational field	Interacting/collaborating/discussing/exchanging knowledge, views, ideas, and expertise with one or more professionals from the field in meetings, projects, and more spontaneously in informal meetings. For example: discussing developments in the vocational field during a workplace visit.
	Interacting/collaborating/discussing/sharing with students	Interacting with one or more students. Usually in the role of teacher, not in the role of coach or mentor.
	Interacting/collaborating/discussing/sharing with family and friends	For example: an informal conversation with a student in de halls of the school.
	Asking for and getting feedback from colleagues	Interacting with family, relatives, friends, acquaintances, sports clubs, etc. For example: talking to friends or your own children.
		Asking colleagues for help or advice. Specifically at the initiative of the teacher himself.
		Receiving feedback from a colleague at the teachers' own request or unsolicited, in a conversation situation.
		For example: getting feedback from a colleague or asking a colleague to explain a digital lesson tool.
	Asking for and receiving feedback from vocational practice	Receiving feedback from vocational field at the teachers' own request or unsolicited, in a conversation situation.
		For example: receiving feedback from an internship supervisor about the teacher him/herself or quality of the educational training.

Appendix C. Professional development activities of vocational teachers (Chapter 2). (continued)

Type	Subtype	Description and examples
Engaging in tasks, roles, and extracurricular activities	Asking for and receiving feedback from students	Receiving feedback from student(s) at the teachers' own request or unsolicited, in an informal conversation situation. For example: getting feedback from students about the lessons.
	Coordinating, organising, and executing tasks	Coordinating and organising extracurricular activities based on assigned tasks and your own position. Carrying out tasks within the teacher team or the school. For example: organising and planning internships for students, organising a professionalisation day for colleagues or preparing for and participating in an internal audit, inspection visit or accreditation.
	Coaching and mentoring colleagues or student teachers	Coaching, mentoring and guiding (novice) colleagues. Coaching, mentoring and guiding student teachers as a supervisor, in planned or unplanned conversations and meetings. For example: counselling meeting with a teacher student or mentoring a new teacher colleague.
	Networking	Networking activities and network meetings. For example: network meeting at a conference, network meeting in school or network meeting in the context of a (regional) project.
	Going abroad	Travelling abroad in the context of project orientation, professionalisation or an exchange project. For example: study trip to Germany.
	Applying for a job/task	Applying for a job, role, or position inside or outside of the school. For example: job interview at an exam supplier.
Consulting (offline/online) information sources	Staying up-to-date: seeking, reading, studying professional information	Staying up-to-date by searching, reading and studying specific professional information, such as offline/online articles, books, and magazines. For example: studying information about your field or education.

Appendix C. Professional development activities of vocational teachers (Chapter 2). (continued)

Type	Subtype	Description and examples
	Research and inquiry	<p>Doing online/offline research and inquiries in the context of a task, particular topic, target or issue. This involves retrieving information in the context of a formal or informal research question that needs to be answered.</p> <p><u>Note:</u> conducting research in the context of a (master's) degree programme.</p> <p>For example: doing research on how to design a digital portfolio (searching for information).</p>
	Consulting online sources: social media and newsletters	<p>Obtaining information via social media, newsletters in your mailbox and other media you come across by scanning the information.</p> <p>For example: reading an article via LinkedIn or reading a digital newsletter sent to your mailbox.</p>
	Watching TV and video	<p>Watching TV, movies, or documentaries.</p>
	Inspirational activities	<p>For example: watching a documentary on a specific topic.</p>
		<p>Activities outside the school context that lead to inspiration.</p>
Experimenting and innovating	Designing a new educational program	<p>For example: visiting a museum or making music.</p> <p>Designing and preparing a new (digital) lesson series or module, often together with colleagues.</p>
	Experimenting (digitally) within teaching and curriculum activities	<p>For example: designing a new project or learning trajectory for students.</p> <p>Experimenting (digitally) within teachers' own lessons or curriculum activities. Individually, or with one or more colleagues. This involves carrying out an experiment or innovation.</p>
		<p>This can also include colleagues from other schools.</p> <p>For example: experimenting with a different classroom approach, different methods or trying out and setting up digital tools, individually or with colleagues.</p>

Appendix C. Professional development activities of vocational teachers (Chapter 2). (continued)

Type	Subtype	Description and examples
	Innovating in a teacher team/school	Being involved in implementing a broader innovation or change within the teacher team and the school organisation, matching the strategic choice of a school and team. This concerns innovations larger in scope than the teachers' own classroom or changing and updating a module. This could also be a technological innovation. For example: experimenting with a different assessment system within the teacher team.
Reflection and evaluation	Individual reflection	Self-reflection on work in general. For example: reflecting on limiting tasks in the teacher team.
	Reflecting and evaluating with colleagues	Reflecting and evaluating together with one or more colleagues or management on work, tasks, roles or curriculum activities in the form of interview or collegial consultation with a specific issue: 'how do I deal with ...' Conversations with a colleague about the safety experienced in the teacher team. For example: a curriculum review in the teacher team, an assessment interview with a colleague or a conversation with management about the professional workload.
	Reflecting and evaluating with professional outside school	Work-related reflecting and evaluating with a professional, an external person outside school context. For example: reflecting on the personal professional development with a researcher in light of participation in a research program.
	Reflecting and evaluating with students	Reflecting and evaluating with students on the content of educational programmes, curriculum activities or other topics. For example: evaluating, in-class and with students, how things are going in the classroom.
	Reflecting and evaluating with vocational practice	Reflecting and evaluating with the vocational field on the content of educational programmes or other subjects, in an interactive setting. For example: evaluating with the vocational field as a result of a specific training.

Appendix C. Professional development activities of vocational teachers (Chapter 2). (continued)

Type	Subtype	Description and examples
Formal development activities	Organised professional development activity or programme (online or offline) in vocational school	Participating in an organised activity in school for the purpose of learning and improving teaching, student learning, executing tasks, and innovations. For example: a professional development event on digital innovations in the vocational school.
	Organised professional development activity or programme (online or offline) outside school	Participating in an organised activity outside of the own vocational school context for the purpose of learning and improving teaching, student learning, executing tasks, and innovations. Participating in a professional development training on creative problem-solving organised by an expert organisation. For example: an online webinar performed by a consultancy on digitisation in education.
	Organised professional development activity or programme outside work context	Participating in an organised activity for the purpose of learning and improving a personal hobby or in the context of volunteer work. For example: training in the context of executing tasks for the local council.
	Courses for a degree or credits	Taking courses as part of a degree programme. For example: taking a course to obtain a master's degree in Learning & Innovation.
	Courses for professional development credits	Taking courses to obtain professional development credits. For example: taking a course to obtain credits to supervise and assess student teachers.
	Receiving structural coaching	Receiving coaching as a formal and school-sponsored activity to provide teachers with professional development. For example: receiving guidance by a professional career coach.
	Attending a professional conference	Attending professional conferences to present your practice or research and learn from presentations about the developments in a vocational domain. For example: visiting a regional conference on e-commerce (business domain)

Appendix C. Professional development activities of vocational teachers (Chapter 2). (continued)

Type	Subtype	Description and examples
	Conference about education in vocational education	Attending professional conferences to present your practice or research and learn from presentations about new ideas for teaching or learning in vocational education. For example: visiting a national conference on teacher-student feedback
Participating in formal teacher collaboration	Professional learning community in vocational schools	Participating in an existing professional learning community in a vocational school for the purpose of improving teaching, learning, innovating, and executing tasks, formally organised by professional developers or by a group of teachers. For example: participating in a teacher project group within the school that manages the innovation project across teacher teams.
	Formal teacher network	Participating in an ongoing regional or national professional teacher network for the purpose of learning and innovating together. For example: participating in a formal vocational network with vocational schools and higher professional education.

Appendix D. Pilot process for the development of the learner reports (Chapter 2, 3 and 5).

The pilot process was used to develop a learning report (1) to collect the broad spectrum of formal and informal activities that encourage vocational teachers to learn, (2) to gain insight into the language in the learner report fitting vocational teachers to provoke richness of the descriptions, and (3) to gain insight into which open and closed questions stimulate rich and in-depth descriptions of activities, perceived changes, and contributing factors. In several calibration sessions the research team discussed the pilot process.

Aim	Participants	Activity	Main findings (based on discussion in the research team)	Design consequence
Phase 1 October 2017	22 experienced vocational teachers	Participants answered one open question (first design) on paper: <i>Which activities/ meetings / settings / situations stimulated you to learn during your work?</i>	<ul style="list-style-type: none"> There is a wide range of activities that stimulate vocational teachers' learning. The first question in the learner report is crucial and should stimulate teachers to broaden their thinking of activities that encouraged them to learn. Teachers tend to describe their activities in short terms. Additional questions should be asked to stimulate richer descriptions of activities. 	<ul style="list-style-type: none"> A second design was based on Meirink et al. (2007) and the findings of phase 1. To evaluate the second design two versions were designed: one with an open (version A) and one with a closed initial question (version B) (see phase 2).

Appendix D. Pilot process for the development of the learner reports (Chapter 2, 3 and 5). (continued)

Aim	Participants	Activity	Main findings (based on discussion in the research team)	Design consequence
Phase 2 January 2018	<p>a) To evaluate the second design of the learner report.</p> <p>b) To evaluate two versions of the initial question in the learner report: one with an open (version A) and one with a closed initial question (version B).</p>	<ul style="list-style-type: none"> Participants filled out the learner report: version A (2 teachers) or version B (2 teachers). The first author debriefed the participants to review the process. 	<ul style="list-style-type: none"> Version A stimulated the teachers to describe activities from a broad view. Therefore, the initial question in the learner report needs to be open. In addition a rich 'think of list should be included in the initial question to stimulate teachers thinking. Certain concepts appear to be too abstract for teachers. This limits them in their richness of descriptions. For example: <ul style="list-style-type: none"> the word 'changes' is more stimulating for them than the word 'impact' the word 'activity' relates to much to formal type of activities, therefore the word 'situation' is more stimulating. 	<p>The third design of the learner report includes:</p> <ul style="list-style-type: none"> an open initial question supplemented with a 'think of list' to inspire teachers questions are supplemented with stimulating additional sub-questions to stimulate the richness of the descriptions.
Phase 3 April 2018	<p>a) Evaluating the third design of the learner report</p>	<p>The expert critical evaluated the learner report focused on gaining rich information on the activities and perceived changes.</p>	<ul style="list-style-type: none"> An assessment questions (scale 1-5) before an open question on perceived changes, stimulate participants to describe perceived changes in a rich way. When the richness of the learner report is incomplete the researcher has to gather missing information through additional interviews. 	<p>The fourth design of the learner report includes:</p> <ul style="list-style-type: none"> assessment questions (scale 1-5) followed by an open question to describe the chosen assessment scale. In case of incomplete data, an additional interview, by phone was included in the procedure.

Appendix D. Pilot process for the development of the learner reports (Chapter 2, 3 and 5). (continued)

Aim	Participants	Activity	Main findings (based on discussion in the research team)	Design consequence
Phase 4 June 2018	<p>a) Evaluating the fourth design of the learner report.</p> <p>Two experienced vocational teachers</p>	<p>Participants filled out the learner report.</p> <p>The first author debriefed the participants to review the process.</p>	<p>A digital easy-to-fill-in format of the learner report motivates teachers to participate and to make rich descriptions of their activities.</p> <p>Changes in words:</p> <ul style="list-style-type: none"> To capture formal and informal activities, teachers are stimulated by the words: planned and unplanned activities. To capture the wide range of activities that stimulate teachers to learn, the questions include the words as 'useful activity'. 	<p>The fifth design of the learner report includes:</p> <ul style="list-style-type: none"> Digital version of the learner report The words 'planned and unplanned activities' and 'useful activity' next to 'activity' that stimulates them to learn.
Phase 5 September 2018	<p>a) Testing the digital (fifth) version of the learner report.</p> <p>Two teachers and two experts.</p>	<p>Two experts on digital tools supported drawing up criteria for a digital version of the learner report.</p> <p>Two teachers filled out the digital learner report.</p> <p>The first author debriefed the participants and experts to review the process.</p>	<p>The number of activities that a teacher can describe is too large and contributes to research fatigue. Completing fewer activities contributes to the quality of the data.</p> <p>The frequency of data collection moments must take into account that (1) participants need a two week period, on average, to complete the learner report (2) a period of six to eight weeks is appropriate to reflect on learning situations and can be fitted into the hustle and bustle of teachers and (3) vocational schools are situated in different regions in the Netherlands, and therefore have different holiday periods.</p>	<p>The final design of the learner report was completed.</p> <p>The frequency of data collection moments were set at three per school year.</p> <p>This frequency gives the least chance of dropouts.</p>

Appendix E. Learner report guide (Chapter 3 and Chapter 5).

<i>Section</i>	<i>Question</i>
1) Stimulating and inventory	What have you done in the past six to eight weeks or which situations have you experienced in the context of your professional development or your development as a vocational teacher?
2) Selecting learning and useful situations	Select one to five situations from those mentioned in question 1 that you found useful or encouraged you to learn. Give these situations a short title.
3) Description of the situations (in a story-like manner)	Describe the selected situation(s) as clearly and specifically as possible. <ul style="list-style-type: none">• What was the situation and what was it about?• What was the cause and aim of the situation (if any)?• Who were present and involved in the situation? What were their roles and positions?• What did you do in this situation?• Where did the situation take place?
4 Learning outcome	To what extent did the situation(s) you described in question 3 encouraged you to learn? (assessment scale 1 to 5) Provide a description: <ul style="list-style-type: none">• Why did you choose this number?• What have you learned in this situation?• Why did the situation encourage you to learn?• Which characteristics of the situation contributed to your learning?
5 Changes	To what extent has this situation(s) affected your thinking and acting as a vocational teacher? (assessment scale 1 to 5) Provide a description of those changes: <ul style="list-style-type: none">• Has anything changed in your view, conviction, or opinion? If so, then what?• Has anything changed in your knowledge? If so, then what?• Has anything changed in your actions? Have you started doing things differently? If so, then what?

Appendix F. Interview guide (Chapter 3 and Chapter 5).

Section	Question
1 Selecting situations	<p>Which five situations (from this past year) have contributed mostly to your professional development?</p> <p>[The participant makes a choice from the activities he/she described in the learner reports during that past year.]</p> <p><i>The following questions are asked per activity</i></p>
2 Reactivate their memory	<ul style="list-style-type: none"> • Can you remember this particular situation? • What do you remember about it: what happened in this situation? • Do you remember what you learned from it?
3 Additional change	<p>In the learner report you described the perceived earlier-reported changes as: [researcher reads text from the learner report]</p> <ul style="list-style-type: none"> • Are there additions to the described changes? <ul style="list-style-type: none"> • What has changed in your acting? Do you do things differently? • What has changed in your views, beliefs, conviction, or opinion? • What has changed in your knowledge? • Would you change the assessment of the perceived changes in situation [...] and why? (re-assessment changes scale 1 to 5)
4 Contributing factors	<ul style="list-style-type: none"> • What contributed in this situation to the perceived changes?

Appendix I. Characteristics of the three CPD profiles of vocational teachers and the representative teacher per profile (Chapter 5).

Aspect	Profile 1		Profile 2		Profile 3	
	General characteristics	Representative teacher Elizabeth	General characteristics	Representative teacher Olivia	General profile 3 characteristics	Representative teacher Nathan
Characteristics	Informal	Characteristics Elizabeth	Characteristics Olivia	Description	Formal and informal	Description
Activities	Informal	Elizabeth described 14 activities, of which 86% are <i>informal</i> type of activities.	Informal	Olivia described 18 activities, of which 83% are <i>informal</i> type of activities.	Formal and informal	Nathan described 26 activities, of which 31% are <i>formal</i> type of activities and the others are <i>informal</i> type of activities.
Type of activities	Teaching and coaching Experimenting and innovating Interaction	Teaching and coaching Experimenting and innovating Interaction	Reflecting and evaluating Tasks and roles Interaction	Reflecting and evaluating Tasks and roles Interaction	Programs Courses Reflection and evaluating Tasks and roles	Programs Courses Reflection and evaluating Tasks and roles development <i>programs</i> , for example about teaching methods or regulation in vocational education, or relate to courses, such as a job-crafting course or a master's degree. The <i>informal</i> type of activities Nathan described are mostly activities in which he learns from executing <i>tasks and roles</i> , and <i>reflecting</i> , such as an audit process and a performance review with the school leader.

Appendix I. Characteristics of the three CPD profiles of vocational teachers and the representative teacher per profile (Chapter 5). (continued)

Aspect	Profile 1			Profile 2			Profile 3		
	Teaching and coaching students	Teaching and coaching students	Mostly perceived changes in thinking and acting are	Working in a teacher team/school	Working in a teacher team/school	Mostly perceived changes in thinking and acting concern	Personal and career development	Personal and career development	Mostly perceived changes in thinking and acting are about his <i>personal and career development</i> , such as his talents, strengths and challenges. Perceived changes also concern his ideas and views on <i>vocational education</i> , changes in <i>vocational practice</i> , for example the developments in e-commerce in the business domain and collaborating with <i>colleagues and stakeholders</i> inside and outside his school.
Learning outcomes	Designing education	Designing education	Designing education	Designing education	Designing education	Designing education	Designing education	Designing education	Designing education
Teaching and coaching students	Teaching and coaching students	Teaching and coaching students	Teaching and coaching students	Teaching and coaching students	Teaching and coaching students	Teaching and coaching students	Teaching and coaching students	Teaching and coaching students	Teaching and coaching students
Mostly perceived changes in thinking and acting are	Mostly perceived changes in thinking and acting are about pedagogical aspects of <i>teaching and coaching students</i> : how to interact with and motivate students in lessons and using (digital) teaching methods.	Mostly perceived changes in thinking and acting are about pedagogical aspects of <i>teaching and coaching students</i> : how to interact with and motivate students in lessons and using (digital) teaching methods.	Mostly perceived changes in thinking and acting are about pedagogical aspects of <i>teaching and coaching students</i> : how to interact with and motivate students in lessons and using (digital) teaching methods.	Mostly perceived changes in thinking and acting are about pedagogical aspects of <i>teaching and coaching students</i> : how to interact with and motivate students in lessons and using (digital) teaching methods.	Mostly perceived changes in thinking and acting are about pedagogical aspects of <i>teaching and coaching students</i> : how to interact with and motivate students in lessons and using (digital) teaching methods.	Mostly perceived changes in thinking and acting are about pedagogical aspects of <i>teaching and coaching students</i> : how to interact with and motivate students in lessons and using (digital) teaching methods.	Mostly perceived changes in thinking and acting are about pedagogical aspects of <i>teaching and coaching students</i> : how to interact with and motivate students in lessons and using (digital) teaching methods.	Mostly perceived changes in thinking and acting are about pedagogical aspects of <i>teaching and coaching students</i> : how to interact with and motivate students in lessons and using (digital) teaching methods.	Mostly perceived changes in thinking and acting are about pedagogical aspects of <i>teaching and coaching students</i> : how to interact with and motivate students in lessons and using (digital) teaching methods.
Working in a teacher team/school	Working in a teacher team/school	Working in a teacher team/school	Working in a teacher team/school	Working in a teacher team/school	Working in a teacher team/school	Working in a teacher team/school	Working in a teacher team/school	Working in a teacher team/school	Working in a teacher team/school

Appendix I. Characteristics of the three CPD profiles of vocational teachers and the representative teacher per profile (Chapter 5). (continued)

Aspect	Profile 1			Profile 2			Profile 3		
	Contributing factors	Collective participation (interacting with colleagues and students)	Collective participation (interacting with colleagues in her teacher team. Alignment with her daily practice is important for her to learn, especially related to her daily interactions with students and her colleagues. On the one hand, having a <i>positive feeling</i> or on the other hand, experiencing <i>difficulties</i> during or because of the activity is important for her learning. Elizabeth described that she learns when she is challenged to be <i>active</i> : experience, explore or experiment.	Collective participation (interacting with colleagues)	Collective participation (interacting with colleagues)	Olivia's learning is stimulated by <i>interacting</i> with her colleagues in her school. <i>Alignment</i> with her daily practice in her role as teacher and teacher educator, is also an important factor. For Olivia is her <i>personal interest</i> in her role as a teacher educator a stimulating factor in her learning.	Collective participation (interacting with colleagues and experts)	Collective participation (interacting with colleagues and experts)	The most important factor that stimulates Nathan's learning is the <i>interaction</i> with both colleagues and experts. <i>Active participation</i> also stimulates him to learn, for example through active experimenting and researching. He also described he learned through <i>reflection</i> on and in action, such as evaluating with a student teacher or reflecting on tasks, and he learned because the activity created a <i>positive feeling</i> about himself, for example agency on his choices.
Contributing factors	Collective participation (interacting with colleagues and students)	Collective participation (interacting with colleagues in her teacher team. Alignment with her daily practice is important for her to learn, especially related to her daily interactions with students and her colleagues. On the one hand, having a <i>positive feeling</i> or on the other hand, experiencing <i>difficulties</i> during or because of the activity is important for her learning. Elizabeth described that she learns when she is challenged to be <i>active</i> : experience, explore or experiment.	Collective participation (interacting with colleagues)	Collective participation (interacting with colleagues)	Olivia's learning is stimulated by <i>interacting</i> with her colleagues in her school. <i>Alignment</i> with her daily practice in her role as teacher and teacher educator, is also an important factor. For Olivia is her <i>personal interest</i> in her role as a teacher educator a stimulating factor in her learning.	Collective participation (interacting with colleagues and experts)	Collective participation (interacting with colleagues and experts)	The most important factor that stimulates Nathan's learning is the <i>interaction</i> with both colleagues and experts. <i>Active participation</i> also stimulates him to learn, for example through active experimenting and researching. He also described he learned through <i>reflection</i> on and in action, such as evaluating with a student teacher or reflecting on tasks, and he learned because the activity created a <i>positive feeling</i> about himself, for example agency on his choices.	

Appendix J. Pilot process for concept mapping (Chapter 4 and 5).

The pilot process for concept mapping aimed to refine (1) the research protocol and (2) the use of BrainWeaver for constructing concept maps (CMs) by vocational teachers. The process focused on prompt formulation, information provision, construction process, member-check interviews, and software usability. Findings informed adjustments to instructions, materials, and conditions for the main study. In several calibration sessions multiple researchers and experts discussed the pilot process.

Phase	Aim	Participants	Activity	Main findings and conclusions (based on discussion with researchers and experts)	Design consequence
Phase 1 December 2017	To identify which prompts elicit the most meaningful Concept Map (CM)	Two researchers and one expert.	The first author constructed five different prompts (focus question). All prompts were discussed with researchers and expert.	Effective prompts must be specific, domain-related, and stimulate broad teacher thinking (knowledge, beliefs, examples).	Final prompt was formulated: <i>"As an experienced teacher in the domain of [welfare or business] I have knowledge of and views on ..."</i> Next an initial protocol was developed based on Van den Bogaart et al. (2016) including: <ol style="list-style-type: none"> 1. Information letter 2. Data collection protocol for CM construction 3. Data collection protocol for member-check interview
Phase 2 April – May 2018	To refine data collection protocols	Eight experienced teachers			

Appendix J. Pilot process for concept mapping (Chapter 4 and 5). (continued)

Phase	Aim	Participants	Activity	Main findings and conclusions (based on discussion with researchers and experts)	Design consequence
	a) Refine information letter		<p>Participants read the information letter and provided suggestions for improvement.</p> <ul style="list-style-type: none"> • The pilot revealed that the letter contained too much text. Teachers recommended adding visuals (e.g., an image of a head with a brain) to appeal to visually oriented participants. • The information about creating a CM was perceived as abstract; including an example in the letter makes the instruction more concrete. • An example of a CM should illustrate different knowledge domains and encouraging participants to take a broad perspective on their vocation. • Better preparation via the information letter reduces the time needed for CM construction. 	<p>The second design of the information letter includes:</p> <ul style="list-style-type: none"> • improved design of the information letter with visuals. • an example of a CM from another vocation (e.g., from a skipper). • a requirement for a quiet, private space for CM construction (see phase 2.2). 	

Appendix J. Pilot process for concept mapping (Chapter 4 and 5). (Continued)

Phase	Aim	Participants	Activity	Main findings and conclusions (based on discussion with researchers and experts)	Design consequence
	b) Refine data collection protocol for constructing CM		<ul style="list-style-type: none"> Participants constructed a CM. The researcher evaluated the process together with the participants. 	<ul style="list-style-type: none"> Introducing the CM was time-consuming. This process needs to be simplified and supported with visuals and examples. Discussing a clear example of a CM may help to better understand what is expected in the content of the CM. Activating prior knowledge during construction proved challenging but is essential for creating rich CMs. The language (concepts, relations, annotations) used in the instructions is too abstract. For example, describing relationships was challenging and the distinction between concepts and sub-concepts was unclear. How participants start associating (brainstorming) about the structure and content of their CM varies: some prefer paper, others directly start using the software programme BrainWeaver. 	<p>The second design of the data collection protocol for CM construction includes:</p> <ul style="list-style-type: none"> a poster to support the start of the construction of the CM, in which the role of annotations was explicitly described, the difference between concepts and sub-concepts is clarified and clarification on the link between research, concept mapping, and focus on concepts, relationships, and annotations multiple examples of relationship for inspiration. the term “annotations” was replaced by “explanations” and the word “concept” was replaced by “topic.” instructions for the software programme BrainWeaver includes a printed version of the software interface and explain the full program first, then allow participants to choose whether to start associating digitally or on paper.
			<ul style="list-style-type: none"> Participants should choose their preferred approach. Providing a printed version of the software interface and placing the focus question (prompt) on paper supports brainstorming better than a blank sheet. Participants spend too much time focusing on defining concepts and structure. They need a better understanding of what is expected in the CM. The number of concepts should be limited (10–20) to maintain clarity. Constructing CMs in a team setting caused distractions and reduced quality. Conditions must be agreed upon: quiet space, separate tables, at least two hours. 		


Appendix J. Pilot process for concept mapping (Chapter 4 and 5). (continued)

Phase	Aim	Participants	Activity	Main findings and conclusions (based on discussion with researchers and experts)	Design consequence
	c) Refine data collection protocol for member-check interview		<ul style="list-style-type: none"> Participants took part in a member-check interview after constructing the CM. The researcher evaluated the process together with the participants. 	<ul style="list-style-type: none"> Conducting a member-check interview within one week proved impractical due to busy schedules of both participants and the researcher. Both face-to-face member-check interviews and interviews by phone were conducted. Telephone interviews were perceived as more productive than face-to-face conversations, possibly because they were more focused and allowed more topics to be covered in less time. The purpose of the member-check interview is to supplement and clarify the CM. Interview questions need to be concise and goal-oriented. Based on the member-check interview, the researcher adds missing information to the map, requiring a second member-check for confirmation. 	<p>The second design of the data collection protocol for member-check interview includes:</p> <ul style="list-style-type: none"> in preparation to the member-check interview the researcher reviews the CM for ambiguities or incompleteness. during the member-check interview the researcher focuses on additional explanations where concepts or relationships are missing and asks for clarification of vague or unclear concepts, relationships, or explanations. if new relationships are added during the member-check interview, explicit permission is requested from the participant to add this to the CM. after the interview, the researcher updates the CM and sends it back to the participant for approval (second member-check). member-check interviews are scheduled two weeks after map construction of the CM and conducted by phone.

Appendix J. Pilot process for concept mapping (Chapter 4 and 5). (continued)

Phase	Aim	Participants	Activity	Main findings and conclusions (based on discussion with researchers and experts)	Design consequence
Phase 3 May – September 2018	To improve BrainWeaver usability	Two experts and two experienced teachers	Experts and teachers tested and suggested improvements.	<ul style="list-style-type: none"> The CMs were sometimes incomplete due to lack of auto-save; this feature must be added. Regarding the formulas within in BrainWeaver: parameters should be adjustable manually by setting a custom threshold (e.g., if a concept has 2 or 3 annotations, then its concreteness score = 1). The usability will be increased when an undo function is added to the program. CMs must be fully visible and readable when printed; screenshots should no longer be necessary. Annotations should be printed completely for each concept and relation. If none exist, the print layout should adapt for clarity. Increase the use of colour for better visualisation. During “association,” concepts and annotations should be easily removable. 	To enhance user-friendliness of the software programme BrainWeaver adjustments were implemented: <ul style="list-style-type: none"> auto-save colours adjustable parameters undo function the opportunity to print fully visible CMs easily removal of concepts or annotations
Phase 4 September 2018	To explore suitable settings for CM construction	Three experienced teachers and three educational advisors	<ul style="list-style-type: none"> Participants constructed a CM. The researcher evaluated the process together with the participants. 	<ul style="list-style-type: none"> Working with a group of three teachers is feasible; larger groups require a second researcher for support. Explaining the construction process to a group was complex because each teacher interpreted the task differently. Participants indicated that interaction with colleagues stimulated activation of knowledge, but this is undesirable because the goal is to capture individual professional knowledge and beliefs. 	The following setting criteria have been established for constructing CMs: <ul style="list-style-type: none"> for practical reasons, CM construction sessions will be planned in small group settings or in individual settings, while maintaining consistent conditions. during the construction of CMs, it will be explicitly stated that the focus is on individual knowledge.





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About the author

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Marjanne Hagedoorn completed her Bachelor of Education in Primary Teaching [Pabo] at Saxion University of Applied Sciences in Deventer in 2003, followed by a Master's degree in Educational Science at the University of Groningen, which she completed in 2005. That same year, she began her career as a teacher in vocational education (mbo) at Landstede mbo (Zwolle), within the social care programmes. From 2007 onwards, alongside her teaching role, she also worked as a practice-based researcher at the same institution. In 2012, she additionally took on the role of educational advisor for the social care programmes across multiple locations. In 2017, alongside her ongoing work as a teacher, educational advisor and researcher, she commenced her PhD research on professional development of experienced teachers in vocational education at the Open University. In 2019, she transitioned to a support role within the school, where she established the *practoraat* [research group in vocational education] in Teacher Professionalisation. Within this role, she is further involved in policy development, designing professional development programmes, and research on the learning and development of professionals in vocational education. Marjanne lives in Kampen together with Pim, and their children Tom and Anne.

Publications and presentations

Scientific publications and presentations

Publications in peer reviewed international journals

Hagedoorn, M., Koopman, M., Bouwmans, M. & de Bruijn, E. (2023). One size does not fit all – mapping informal and formal professional development activities of vocational teachers. *Teachers and Teaching: Theory and Practice*, 31(3), 372-392. <https://doi.org/10.1080/13540602.2023.2276743>

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Hagedoorn, M., Koopman, M., & de Bruijn, E. (2025, June). *Het illustreren van leren: Een multiple case study naar continue professionele ontwikkeling van ervaren mbo-docenten [Illustrating learning: A multiple case study of continuing professional development of experienced vocational teachers]*. [Paper presentation]. Onderwijs Research Dagen (ORD), Leuven, Belgium.

Valorisation activities: Publications, products and presentations for practice

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A

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