FOOD FOR THOUGHT

UNDERSTANDING STUDENTS' VOCATIONAL KNOWLEDGE

WENJA HEUSDENS

learning processes articulating vocational knowledge contextualising concretising conceptualising inferentialism philosophical theory

FOOD FOR THOUGHT
Understanding students' vocational knowledge

LEESVOER EN DENKWERK
Grip krijgen op beroepskennis van mbo-studenten
(met een samenvatting in het Nederlands)

Proefschrift

ter verkrijging van de graad van doctor
aan de Universiteit Utrecht op gezag van
de rector magnificus, prof. dr. G.J. van der Zwaan,
ingevolge het besluit van het college voor
promoties in het openbaar te verdedigen op
woensdag 25 april 2018 des middags te 2.30 uur

door

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geboren op 7 januari 1975 te Haarlem

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CONTENT

"What's cooking?"

WHAT'S GOING ON? WHAT'S HAPPENING?
(www.thefreedictionary.com)

CHAPTER 1

Mise en place

(In a professional kitchen) the preparation of dishes and ingredients before the beginning of service. French, literally 'putting in place' (www.thefreedictionary.com).

GENERAL INTRODUCTION

A vocational student named Boyan is trained to become a culinary chef. He is in his third year of a four-year vocational educational programme. For his internship, Boyan has been working for several weeks in the kitchen of a fine dining seafood restaurant.

One day, a staff member called in sick, and therefore, the sous chef assigned Boyan to prepare the daily special: a creamy salmon chowder. As a response, Boyan immediately practiced mise en place; he completed all his prep work right up to the point of cooking, when Boyan discovered half of the delivered salmon had gone bad. Under the constraints of time, the sous chef instructed Boyan to decide how to adjust the daily special. Boyan realised he therefore had to inspect all food deliveries again and check the inventory. He had to inform his staff and he reassigned them to different tasks. Furthermore, Boyan realised that when he decided to add new ingredients to the daily special, he had to consider how the ingredients would fit the overall ambience of the restaurant. And finally, Boyan realised that when he was going to adjust the daily special, all menus should be checked for food allergy labels as prescribed in the latest food regulation.

Encounters in occupational practice as portrayed in this opening episode are not uncommon to most culinary chefs. In the spur of the moment, culinary chefs are required to make all kinds of judgements and decisions that can influence the subsequent course of action. Daily, practitioners are challenged to provide some kind of coherence between what they know and how to act. This means for students (i.e., aspiring practitioners) that they are challenged to develop a broad range of relevant vocational knowledge and learn how to appropriately apply this kind of knowledge in constantly changing situations.

The opening episode exemplifies the complex nature of vocational knowledge. It illustrates a process in which the culinary student Boyan is required to make meaning of vocational knowledge through his use and interpretation of the concepts related to the act of preparing a daily special. Hence, a seemingly simple example such as preparing some daily special challenges students to activate all kinds of knowledge specific for action. For instance, Boyan should activate knowledge of technical-instrumental aspects such as inventory and stock, and knowledge about the social, organisational and occupational environment such as how to manage staff, tune into the restaurant type and concept, and know about the rules and regulations of the industry. Furthermore, a lot of cooking involves knowledge from disciplines such as chemistry, biology and mathematics. For instance, in the preparation of a creamy salmon chowder the mathematical concept of ratio is at stake to learn the correct amount of ingredients.

In the contemporary context of vocational education and training (VET) in the Netherlands, students learn and develop vocational knowledge in a wide variety of learning environments

(e.g., theoretical classes, skills labs, internships, training centres), within a particular domain of occupational practice (e.g., agriculture, engineering and technology, economics, health and social care), in a school (e.g., an institute for culinary arts or a technical college), and in an occupation-specific field of practice (e.g., the hospitality industry, IT and Media, business administration). In different sites of learning, students are challenged to develop all kinds of knowledge, and to give meaning to vocational knowledge which enables them to think and act in occupational practice (Bijlsma, Schaap & De Bruijn, 2016; Schaap, De Bruijn, Van der Schaaf, Baartman & Kirschner, 2011). Hence, students are challenged to develop the means to move beyond contextually specific applications of knowledge (Wheelahan, 2015; Young, 2007), and therefore, they are required to understand both the general context, as well as specific situations they are expected to deal with (Eraut, 2000).

THE NATURE OF STUDENTS' VOCATIONAL KNOWLEDGE

Understanding students' vocational knowledge and the processes by which it develops is at the heart of this qualitative thesis on students' learning processes in the context of vocational education and training (VET). Although in the literature understandings of students' learning processes have been widely discussed and criticised (Baartman & De Bruijn, 2011; Lobato, 2006; Schaap, De Bruijn, Van der Schaaf & Kirschner, 2009; Vermunt & Verloop, 1999; Young, 2008; Wheelahan, 2015; Winch, 2013), a better understanding of students' learning processes and knowledge development in the context of VET is necessary. In the literature, discussions about students' learning processes in VET often illustrate dualist or dichotomous ways of thinking, such as school versus the workplace, theory versus practice, general versus specific. However, such dualist or dichotomous ways of thinking do not shed light on the complex nature of vocational knowledge.

In both theory and practice, dichotomies illustrate common approaches that are used to address students' vocational knowledge and its development in the context of VET (Endedijk & Bronkhorst, 2014; Tynjälä, 2008; 2012). For instance, educational research perspectives taken on students' learning processes are often concerned with what is intended for students to learn as laid down in curricula (Wheelahan, 2015), or with the differences between school-based learning and workplace-learning (Tynjälä, 2013), or to bridge the gap between school and the workplace (Aprea & Sappa 2015; Bakker & Akkerman, 2014). However, to describe students' vocational knowledge development as putting together kinds of knowledge acquired in different sites is too simplistic and undervalues the complex nature of vocational knowledge, and the sometimes-intimate relationships between knowledge and action as exemplified in the opening episode

To think about students' vocational knowledge in terms of what is acquired in school and applied in the workplace suggests vocational knowledge can be perceived as something static acquired in one context and applied in the next (Beach, 1999; Lobato, 2006). Such perspectives taken on vocational knowledge tend to be more about exploring the effects of different contexts on students' learning rather than exploring the nature of students'

vocational knowledge and how students develop this kind of knowledge (Bronkhorst & Akkerman, 2016). Furthermore, in practice, curricular designs of many educational institutes are still based on the idea students should learn theory in school and practical skills in the workplace (Zitter & Hoeve, 2012). Although the contexts in which students learn might be different — certainly encounters in occupational practices are hardly ever the same — to explore students' learning is always about the same processes, namely, the processes by which students develop vocational knowledge. Furthermore, more and more scholars nowadays argue students' vocational knowledge is subtler than the image of something general acquired in school and applied in concrete work situations (Billett, 2014; Griffiths & Guile, 2003; Guile, 2014; Noorloos, Taylor, Bakker & Derry, 2017; Schaap et al., 2009; Wheelahan, 2015; Winch, 2013). However, among these scholars no consensus has been reached yet how to theorise the nature of students' vocational knowledge instead.

In this thesis, I intend to move away from dichotomous ways of thinking about vocational students' learning processes in both theory and practice, and refocus on students' vocational knowledge. Instead of perceiving vocational knowledge as something abstract or to think about it as a learning process with a particular learning outcome, I propose the idea to perceive students' vocational knowledge as something dynamic. To do justice to the complex nature of students' vocational knowledge, I propose to adopt a perspective on students' vocational knowledge in terms of a process, namely, *an ongoing process of learning.*

The aims and relevance of the thesis

To better understand students' vocational knowledge and therefore, to gain insight into students' cognitive processes, this thesis presents an inclusive view on the nature of students' vocational knowledge. To explore students' vocational knowledge is about understanding the nature of vocational knowledge, and how a student like Boyan in the abovementioned episode develops vocational knowledge within a specific field of occupational practice, in this case, culinary education. Alongside the questions what students' vocational knowledge is and how students come to develop vocational knowledge, is the question whether students do in fact know anything at all, namely, what characterises the vocational knowledge of students? To address these questions, three goals are determined:

❶ to theorise the nature of students' vocational knowledge;
❷ to empirically explore the presented theory of the nature of students' vocational knowledge, namely, to explore and illustrate how students develop vocational knowledge during performance in occupational practice, and;
❸ to empirically explore what students know, namely, to describe and illustrate what characterises students' vocational knowledge.

Altogether, this thesis theorises, empirically explores, characterises, and illustrates students' vocational knowledge. Students' vocational knowledge is at focus regardless the context in which students encounter this knowledge. To grasp and reveal students' vocational knowledge, the focus is on those aspects of students' cognitive processes

which can be revealed, articulated, and represented. The importance to understand students' vocational knowledge is exemplified in the key role VET will continue to play in the shift towards more knowledge-intensive societies. For instance, in 2020 nearly half of all jobs will require a medium-level qualification which will often be achieved by some form of VET (Cedefop, 2011). The scientific relevance of this thesis is its contribution to understanding the nature of vocational knowledge and how students develop vocational knowledge by exploring the concept in both theory and practice. In this way, the thesis provides insight into aspiring practitioners' cognitive processes, and students' knowledge building, namely, how students learn and make meaning of vocational knowledge.

The practical relevance of the thesis lies in the empirical inquiries of how students develop vocational knowledge, and in the descriptions of characteristics of students' vocational knowledge. The thesis provides implications towards the development of vocational curricula, assessment and aligned teaching strategies to support students' development of vocational knowledge. More specifically, the findings of the studies might help educators to identify whether students develop the vocational knowledge which is intended for them to learn as laid down in curricula. Furthermore, the results provide information for teachers how to support students' development of vocational knowledge, and input for designers of vocational curricula about learning environments in which students are inducted into relevant applications of vocational knowledge through activities with others, within a specific practice. Hence, through theory and empirical inquiry, the nature of vocational knowledge and the ways in which students develop vocational knowledge are explored.

In the following section, an overview of the individual chapters is presented. The different chapters are introduced and summarised to make clear how they relate to and build on each other, and how each chapter relates to the main aim of this thesis. In Table 1.1 an outline of the thesis is presented.

OVERVIEW OF THE CHAPTERS

Chapter 2 The professional kitchen

In a preliminary study, the case for the thesis was selected. In VET, there is a wide range of courses, levels and fields, and the vocational knowledge and practices in each domain differs to that of another domain. Therefore, in this chapter it is hypothesised that the case for the thesis should involve a learning environment in which students are introduced to the vocational practices of their future occupations, and students should be provided with opportunities to think and act like practitioners. Furthermore, such a learning environment should be a setting in which it is possible to come close to students' cognitive processes during performance in occupational practice without interrupting students' daily routine. In the concept of powerful learning environments (PLEs), a theory and instrument (De Bruijn, Overmaat, Glaudé, Heemskerk, Leeman, Roeleveld, & Van de Venne,

2005; De Corte, 1990) was found for the selection of the case for the studies of this thesis. In chapter 2, first the context of Dutch VET is described, followed by an introduction of the concept of PLEs, and the design and results of the survey study are presented. To increase the chance to find a PLE, the survey study was conducted in two different Dutch senior secondary vocational education programmes, namely, in hospitality management, and building and construction management. Chapter 2 answers the questions: *'What types of powerful learning environments can be distinguished in the design of the learning environments of the educational programmes of building and construction management and hospitality and restaurant management?' and 'Which case can be considered as the most powerful learning environment?'*. The case for the thesis is selected based on the results of the second question and can be considered as a learning environment with powerful learning environment characteristics.

Chapter 3 A new cuisine

Chapter 3 provides the theoretical framework of this thesis. The chapter presents a study in which the nature of vocational knowledge is theorised from a learner's point of view. The following question is answered: How can the nature of students' vocational knowledge be conceptualised? Different scientific research dispositions on students' vocational knowledge are explored, and two conceptual frameworks are integrated to offer an account of the nature of students' vocational knowledge as the activity of contextualising. The idea of contextualising is based on Van Oers' (1998a; 1998b) theory of contextualising and involves an activity-oriented perspective on learning stemming from the cultural-historical activity theory (CHAT) (Van Oers, 1998a; 1998b; Vygotsky, 1978). This perspective highlights the crucial role activity plays in knowledge development (Cobb, 1994; Roth & Radford, 2010), and helps to understand the relationships between the mind (i.e., what people think (and feel)), and action (i.e., what people do) (Daniels, Edwards, Engeström, Gallagher, & Ludvigsen, 2009). In this chapter, the activity-theoretical approach to vocational knowledge is supplemented with ideas borrowed from Brandom's theory of inferentialism (Bakker & Derry, 2011; Brandom, 1994; 2000). This philosophical semantic theory of meaning provides an alternative way to focus on students' cognitive processes, and helps to reveal students' vocational knowledge in terms of a reasoning process.

Chapter 4 Food preparation, cooking and service

Chapter 4 describes an empirical inquiry of the theory of contextualising. A qualitative, exploratory in-depth study in the context of hospitality and culinary education is presented. In this study, students' vocational knowledge is explored in terms of how students articulate the process of contextualising during performance in occupational practice. Contextualising is explored in terms of a process in which students articulate multiple (relevant) reasons for their actions. A pilot study was first conducted, to find a method to reveal students' cognitive processes. Based on the results, a method of reflection-in-real-time-action (Schön, 1983) through means of interviews during performance in occupational practice is selected. Data sources include transcribed video-recordings of interviews with restaurant management students (n=56) and culinary students (n=72).

The results provide the answer to the research question: *How do students develop vocational knowledge during performance in occupational practice?* The results are illustrated with examples from the data.

Chapter 5 Chef's resources

In chapter 5, a study is described that explores what characterises the vocational knowledge of students. This exploratory in-depth study aims to describe characteristics of students' vocational knowledge in the context of contemporary VET to offer insights into what students know and to provide meaning to vocational knowledge. To describe what characterises students' vocational knowledge, their vocational knowledge should be revealed first. Therefore, a snapshot of the process of contextualising is taken at a certain point in students' training programme. An analytic framework developed by Schaap and colleagues (2011) is applied to describe vocational knowledge characteristics specifying 1) occupation-specific knowledge components, and 2) qualities. The framework provides a structure to gain insight into the meaning and relevance of vocational knowledge. A total of 944 of students' articulations of contextualising are labelled and the results provide an answer to the question: "How can students' vocational knowledge be characterised?" Illustrations of occupation-specific knowledge components and qualities for the context of the hospitality industry are provided. This chapter finalises by discussing the implications of the analytic framework serving as a potential tool for teachers and educators in supporting students to contextualise vocational knowledge.

Chapter 6 A review of tomorrow's menu

Chapter 6 finalises this PhD-thesis with a general conclusion and discussion on understanding students' vocational knowledge. A summary of the main findings and implications is presented. From a theoretical perspective, the general discussion argues whether the conceptual and empirical attempts, namely, to theorise and explore the nature of students' vocational knowledge as an ongoing process of learning, has contributed to a better understanding of the complex nature of vocational knowledge. The conceptual framework of this thesis is positioned into a broader context of related debates and research about the issue of learning in VET. Subsequently, a reflection on the process prior to the data collection of the empirical studies is presented. This process reflects an exploration of diverse methods to capture and reveal cognitive processes of individual minds. This prior exploration of methods is briefly described and the lessons learned for future research into cognitive processes are discussed. From a practical perspective, implications for vocational curricula derived from the theory and key findings of the studies are discussed, and recommendations and suggestions for further research are presented. The thesis finalises with concluding remarks and unexpected but promising findings.

Table 1.1
Outline of the thesis

| CHAPTER	TITLE	RESEARCH QUESTIONS	AIMS AND RESEARCH DESIGN
❶	**Mise en place** General introduction	*How can students' vocational knowledge and the processes by which it develops be understood?*	Presents the context, the aims, and an overview of the thesis
❷	**The professional kitchen** Powerful learning environments in VET	❶ *What types of powerful learning environments can be distinguished in the design of the learning environments of the educational programmes of building and construction management and hospitality management?* ❷ *Which case can be considered as the most powerful learning environments?*	A survey study for the case selection of the thesis using a questionnaire
❸	**A new cuisine** Theorising the nature of students' vocational knowledge	*How can the nature of students' vocational knowledge be conceptualised?*	A conceptual framework of the nature of students' vocational knowledge and illustrations from hospitality and culinary education based on a literature study
❹	**Food preparation, cooking and service** An empirical exploration and illustration of how students develop vocational knowledge during performance in occupational practice	*How do students develop vocational knowledge during performance in occupational practice?*	An exploratory in-depth study on students' development of vocational knowledge by video-recorded interviews during performance in occupational practice
❺	**Chef's resources** An empirical exploration and illustration of what students know	*How can students' vocational knowledge be characterised?*	An exploratory in-depth study to describe characteristics and present illustrations of students' vocational knowledge by video-recorded interviews of reflections in real-time action
❻	**A review of tomorrow's menu** General conclusion and discussion	*Does the conceptual and empirical attempts in this thesis contribute to a better understanding of students' vocational knowledge?*	A summary of the main findings and a discussion of the theoretical and practical implications of the key findings of the studies in this thesis.

"Variety is the spice of life"

DIVERSITY MAKES LIFE INTERESTING
This phrase comes from William Cowper's poem "The Task" (1785): "Variety is the very spice of life, that gives it all its flavour" (www.englishforstudents.com)

CHAPTER 2

The professional kitchen
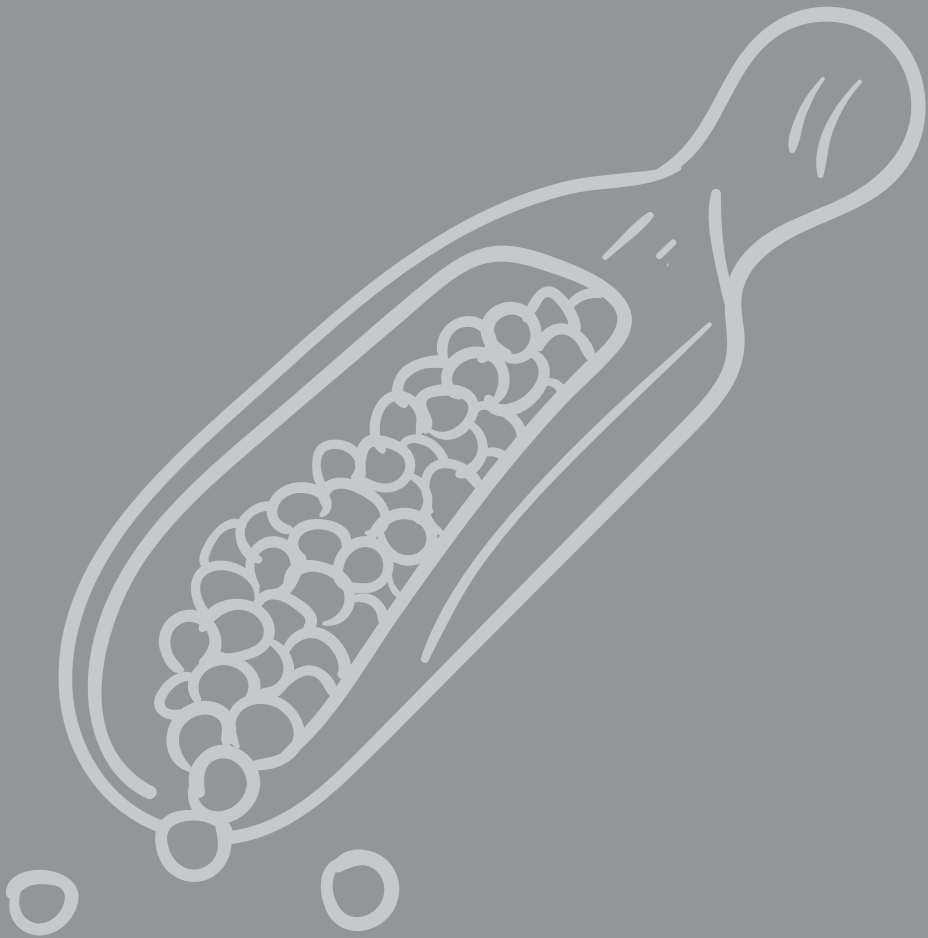
ABSTRACT[1]

The overall aim of the studies presented in this thesis is to understand students' vocational knowledge in the context of vocational education and training (VET). In general, students' vocational knowledge can be characterised as knowledge which is embedded in the situation itself, and in action. To grasp and reveal students' vocational knowledge, a learning environment is required that represents a setting in which students are introduced to vocational practices, and in which students are challenged to use and develop vocational knowledge. The present chapter introduces a survey study on powerful learning environment (PLE), with the aim to select the most promising case for the studies of this thesis. To select a learning environment in which students' vocational knowledge is close at hand, we turn to the concept of powerful learning environment (PLE). A PLE can be defined as a learning environment that is authentic and complex, in which students are challenged to develop understandings about knowledge, metacognitive skills, and flexibility. In a survey study, types of PLEs are distinguished in the design of the learning environments of two educational programmes, namely, building and construction management and hospitality management. Based on the results of the survey study, the case for this thesis is selected.

INTRODUCTION

Research has shown powerful learning environments (PLEs) have a positive effect on activating required learning processes of students during their process towards becoming well-prepared practitioners (see Biemans, De Bruijn, Den Boer & Teurlings, 2013; Collins, Brown & Newman, 1989; De Bruijn, et al., 2005; De Corte, 1990; Koopman, Teune & Beijaard, 2011). For instance, in a PLE students are encouraged to actively learn in context and to effectively solve problems (Koopman et al., 2011). Active learning contributes to advanced thinking and learning activities, resulting in high quality knowledge acquisition (Brown, Collins, & Duguid, 1989; Collins, et al., 1989; Könings, Brand-Gruwel & Merriënboer, 2005; Spiro, Feltovich, Jacobson & Coulson, 1991). Based on the positive effects of powerful learning environment on learning processes, it is hypothesised that a case selection in terms of PLE is a way to optimise the chance to grasp and reveal students' vocational knowledge. The aim of this chapter is to select a case which is characterised with elements of a powerful learning environment. An additional advantage to turn to the concept of PLE is that an instrument to identify PLEs has already been developed (De Bruijn et al., 2005; De Bruijn & Leeman, 2011). Furthermore, this instrument has been validated in two studies in the context of vocational education and training (see Koopman et al., 2011; Biemans et al., 2013), and applied in a third study (Cedefop, 2015).

A survey study was designed in which two different educational training programmes in senior secondary vocational education (SSVE; in Dutch: mbo) were selected, namely, building and construction management and hospitality management. The differences in these educational programmes can be found in their educational cultures. In building and constructing the focus is predominantly on products, whereas the focus in hospitality management is primarily on people and services, we aim to increase the probability to distinguish a PLE in the design of learning environments. Furthermore, the two educational programmes were selected through consults with key players in the field. In this way, we became aware of several innovations that took place during the time of our study. These innovations reflected implementations which were focused on the design of learning environments to promote students' active learning, and to offer students a setting in which they were engaged in solving real-life problems with complex, realistic, and challenging learning tasks (Van Merriënboer & Paas, 2003). Hence, it was argued such innovations also contribute to the probability to distinguish a PLE in one of the two programmes.

In this chapter, two questions are at focus: 1) *What types of PLEs can be distinguished in the design of the learning environments of the educational training programmes of building and construction management and hospitality management?* And 2) *Which case can be considered as the most powerful learning environment?* In the following section, the stage for this thesis is set by describing characteristics of Dutch VET. Subsequently, the concept of powerful learning environments is introduced and a description of the instrument 'Powerful learning environments in VET' is presented. In the results section, an overall view of the participating VET-programmes in terms of PLE is presented, and different types of PLEs are distinguished, to select the most promising case for the thesis. This chapter finalises with discussing how the case for the overall research project was selected.

DUTCH VOCATIONAL EDUCATION AND TRAINING (VET)

One of the key targets of VET in the Netherlands is to prepare students for work (Wesselink, De Jong & Biemans, 2010; De Bruijn & Westerhuis, 2016; De Bruijn, Billett & Onstenk, 2017). Therefore, performing in occupational practice is a pivotal part of VET. The Dutch system in which students are prepared for occupational practice could be characterised as a system of vocational education arranged by a cooperation of governments and social partners, and provides labour market-relevant initial vocational education for mainly young people. Dutch VET qualifies students for work, prepares students for further education and social participation (De Bruijn et al., 2017).

The integrated system of VET is relatively new. As of 1996 various vocational education pathways and school types are all integrated into a single VET system. An integrated system of SSVE is the result of bringing the formerly separate systems of school-based VET and apprentice system together (Biemans, Nieuwenhuis, Poell, Mulder & Wesselink, 2004; Nijhof & Van Esch, 2004; De Bruijn et al., 2017). In the year 2014-2015, around 492,000 students participated in SSVE. Therefore, SSVE was the second largest sector in Dutch education, whereas primary education was the largest and higher professional education (hbo) was third (De Bruijn & Westerhuis, 2016).

SSVE is the context of this thesis. SSVE involves 1 to 4-year educational programmes at 4 qualification levels (mbo 1-4, EQF 1-4[2]), level 1 being the entrance course and level 4 qualifying for both work and higher professional education (hbo, associate degree, and professional bachelor, ISCED Level 5[3]). Students in SSVE are mostly young people of 16 years and older, and a small number of young working adults. SSVE prepares students for a wide range of occupations from nursing assistant, to mechanic or culinary chef. SSVE-programmes and qualifications are offered in 4 different occupation-specific fields, namely, 1) technology, 2) commerce and administration, 3) services and health care, and, 4) agriculture. Most qualifications in SSVE are facilitated by two educational pathways, namely, 1) the school-based pathway (BOL, beroepsopleidende leerweg) with practical periods in companies that make up 20% to a maximum of 59% of study time, and 2) the dual or apprenticeship pathway (BBL, beroepsbegeleidende leerweg), in which training takes place in companies at least 60% of study time. Both pathways in SSVE lead to the same diplomas.

Powerful learning environments

Moerkamp, De Bruijn, Van der Kuip, Onstenk and Voncken (2000) developed a model of 'Powerful learning environments in vocational and higher education and training' based on the ideas of De Corte (1990) and Collins and colleagues (1989). De Bruijn and colleagues (2005) enhanced this model for the context of VET in terms of a classification system which offers a framework to explore the design of learning environments. The classification of De Bruijn and colleagues (2005) is used in this study and involves two dimensions, namely, a content dimension and a guidance dimension (see Table 2.1).

2 EQF: European Qualification Framework
3 International Standard Classification of Education, a department of UNESCO

The content dimension involves underpinning components reflecting the way in which the learning content is dealt with. The guidance dimension involves different types of guidance provided by teachers, other experts (e.g., workplace supervisors) and fellow students, such as modelling or coaching. The classification of De Bruijn and colleagues (2005) has been validated in research by Koopman and colleagues (2011) and Biemans and colleagues (2013) and applied in a European study (Cedefop, 2015).

Table 2.1

Components (I. II, III, IV- content dimension and V –guidance dimension) and poles
(A- powerful and B – less powerful) to assess the 'powerfulness' of learning environments in (secondary) vocational education (Biemans, et al., 2013).

COMPONENTS	POLES	
	POLE A (POWERFUL)	POLE B (LESS POWERFUL)
❶ Learning content	Action-oriented Authentic (also) higher order skills Integrative	Pre-designed Subject-oriented Theoretical Decontextualised
❷ Structure and range	Concentric and broad Broad coverage of competencies Concentric design	Linear and narrow Linear design Narrow content
❸ Learning environment	Rich learning environment Many resources, learning materials, locations Intensive interaction between students High variety in processing and instructional activities	Poor learning environment Poor in stimuli, focused Poor interaction Low variety in guidance
❹ Processing activities	Constructive learning Active, explorative learning Reflective learning	Reproductive learning Applying procedures Standardised assignments Learning with written materials
❺ Guidance	Systematic guidance Fixed order of educational programme Systematic skill development Systematic guidance of learning process	Non-systematic guidance Choice of separate modules From the start, a strong focus on independent learning Support by teachers mainly on request

In the classification system (Table 2.1), the two dimensions (i.e., the content dimension and the guidance dimension) have been developed to distinguish types of powerful learning environments. One could assume for instance, that an educational programme has a high score on the content dimension and offers little systematic guidance. Vice versa, it is possible that an educational programme regarding the content dimension has a low score but provides systematic guidance. To classify types of PLEs, the content dimension and the guidance dimension were operationalised into underlying components. To value the content dimension of a learning environment, four components were distinguished: ❶ learning content, ❷ structure and range of the subject matter, ❸ learning environment, and ❹ processing activities.

For the guidance dimension of a learning environment two components were distinguished: the degree of ❺ structured guidance, which refers to the extent of support of teachers, other experts and fellow students, and, ❻ a specification of the type of guidance used (i.e., modelling, supporting, coaching, evaluating and assessment). For each of the components underlying the dimensions, two statements were formulated, namely, one for the more powerful learning environment type, and the other for the less powerful learning environment type (see Table 2.1). By creating opposite poles, these statements mirror the theoretical basis of the instrument (see De Bruijn et al., 2005; De Bruijn, Leeman & Overmaat, 2006; Moerkamp et al., 2000). To prevent biasing of the responses, both poles were formulated in socially positive terminology.

METHOD

Participants

Two SSVE-programmes in the occupation-specific fields of Technology and Services were selected for this study, namely, building and construction management and hospitality management. SSVE prepares students for many qualifications. For instance, in 2012 SSVE-programmes (ISCED 3/4) prepared students for about 620 different qualifications. To find meaningful differences in the design of learning environments and to manage the data, two different educational training programmes were selected. A large group of VET-institutes offer these two SSVE-programmes and qualify students for building and construction management (n= 56), and for hospitality management (n=35). In these programmes students are trained for different occupation-specific fields of practice, and therefore, these institutes exemplify differences in their educational cultures. Hence, it was hypothesised that the chance to find at least one powerful learning environment in these programmes was reasonable.

The two participating SSVE-programmes of building and construction management and hospitality management both involved a four-year school-based learning route with fulltime time education (i.e., BOL) at level 4. Building and construction management was a middle management training programmes and prepared construction management students to coordinate and supervise a wide variety of projects, including the building of all types of residential, commercial, and industrial structures, roads, bridges, power plants, schools,

and hospitals. The hospitality management students were trained to manage the staff of a business in the hospitality industry, for instance, in a hotel, bar or restaurant. Students were also trained for entrepreneur, which involved managing one's own business or that of others.

Instrument

A questionnaire 'Powerful learning environments in VET' was developed by De Bruijn and colleagues (2005) which involves several questionnaire items with accompanying scales. The questionnaire consists of 20 questions, each comprising one or more sub-items (Biemans, et al., 2013). To illustrate the type of questioning in the questionnaire, an example is presented in Figure 2.1. The scores the team-coordinators attributed to the items were converted into joint variables representing different aspects of PLEs. The variables are the following:

❶ *Typifying, content dimension* (4 items): the extent to which the educational programme can be roughly typified as potentially powerful with respect to the four components of the content dimension (i.e., learning content, structure and range, learning environment, processing activities);

❷ *Powerful elements, content dimension* (13 items): the extent to which the powerful elements of the four components of the content dimension are represented in the educational programme;

❸ *Strong* (guidance dimension) (3 items): the extent to which highly structured (systematic) guidance is offered in the educational programme.

❹ *Broad guidance in the beginning* (guidance dimension) (3 items): the extent to which specific types of powerful guidance are offered in the beginning of the particular educational programme.

Figure 2.1
An example of one component of the ple questionnaire

Component 1. The subject matter

STATEMENTS A	STATEMENTS B
A1. An emphasis on functional and authentic learning	B1. A curriculum divided in clear-cut parts of course material
A2. A curriculum arranged around situations and actions occurring in professional practice	B2. Theory and general skills are dealt with separately
A3. Explicit attention for learning skills and problem solving	B3. A focus on training instrumental skills

(A) WHAT DOES THE INSTITUTE AIM FOR?	(B) WHAT CHARACTERISES THE PRESENT SITUATION AT THE INSTITUTE?
[ ] Completely A	[ ] Completely A
[ ] Completely B	[ ] Completely B
[ ] Closer to A than to B	[ ] Closer to A than to B
[ ] Closer to B than to A	[ ] Closer to B than to A

(C) TO WHAT EXTENT ARE THE ELEMENTS IN THE STATEMENTS OF A AND B CURRENTLY PRESENT IN THE LEARNING ENVIRONMENT?		
Not at all	To some degree	To a large degree
A1	A1	A1
A2	A2	A2
A3	A3	A3
B1	B1	B1
B2	B2	B2
B3	B3	B3

The scale *Typifying* for the content dimension was based upon the answers to four questions about what characterises the present situation of the educational programme related to content activities in terms of more holistic vignettes. The following three scales, namely, *Powerful elements*, *Strong*, and *Broad guidance in the beginning* were constructed from answering the questions in which the team-coordinators had to indicate which precise elements of content activities and guidance activities were represented in the actual educational programme (see Table 2.1). For each educational programme mean scores were calculated for the joint variables corresponding to the content scales, namely, *Typifying* and *Powerful elements*, and the guidance scales, namely, *Strong* and *Broad guidance in the beginning*.

Procedure and response rate

The questionnaire 'Powerful learning environments in VET' was sent to the team-coordinators of all educational training institutes of building and construction management (n=56) and hospitality management (n=35) in the Netherlands. The names and email addresses of the team-coordinators were found in the study guide of senior secondary VET 2011. By phone, the institutes were informed and asked for their participation. The response rate was 31% (see Table 2.2). The team-coordinators of the two selected SSVE-programmes were asked to fill in the questionnaire and indicate to what extent the various aspects of PLEs were represented in their particular educational programme.

Table 2.2
Response rate questionnaires

	N	RESPONSE	PERCENTAGE
Building and construction	56	14	25%
Hospitality	35	14	40%
Total	91	28	31%

A pilot study was first conducted with a senior teacher of a VET programme for audio visual arts and animation, and a senior teacher of a VET programme for services/health care. Adjustments were made in the questionnaire to better fit the current jargon in VET. For instance, the word 'workplace' was changed into 'training in an occupation-specific field of practice' (In Dutch: Beroeps Praktijk Vorming).

Data analysis

Data were analysed in SPSS for two main purposes, namely, (1) to provide an overall view of the two training programmes, and (2) to distinguish types of PLEs (research question 1) to select a case for the overall research project (research question 2). The reliability coefficients for the four questionnaire scales were calculated and showed the following: Typifying $a = 0.82$, Powerful elements $a = 0.84$, Strong $a = 0.73$, and Broad guidance in the beginning $a = 0.63$. To provide an overall view of the position of the educational programmes, mean scores and standard deviations were determined for the content scales Typifying and Powerful elements, and for the guidance scales Strong and Broad guidance in the beginning.

The mean scores of the scales Typifying, Powerful elements, Strong and Broad guidance in the beginning, were categorised as Powerful and Less powerful (see Table 2.3) in which the former represents a more powerful learning environment type, and the other a more traditional learning environment type, to mark opposite poles. The 28 educational programmes were positioned based on their mean scores on the content scales and the guidance scales.

Table 2.3
Categories powerful and less powerful characteristics of learning environments

	TYPIFYING	POWERFUL ELEMENTS	STRONG	BROAD GUIDANCE
Less powerful	< 2,5	< 2	< 2	< 3
Powerful	≥ 2,5	≥ 2	≥ 2	≥ 3

Results
Overall view of the educational programmes

To present an overall view of the learning environments of the two SSVE-programmes in terms of PLEs, the mean scores and standard deviations of the content dimension, and the mean scores and standard deviations of the guidance dimension are presented in Table 2.4 The results show the mean scores on the scale Typifying for building and construction, namely, 2,91 (SD=.66), and the mean score on the scale Typifying for hospitality is 2,58 (SD=.60). These scores are determined on a 4-point scale in which 1 is less powerful and 4 is powerful.

Table 2.4

Means and standard deviations of the scales of the content and guidance
dimension per educational programme

	BUILDING & CONSTRUCTION		HOSPITALITY		ALL	
Content dimension	M	SD	M	SD	M	SD
Typifying (4-point scale)	2,91	.66	2,58	.60	2,74	.64
Powerful elements (3-point scale)	2,55	.38	2,39	.38	2,47	.38
Guidance dimension	M	SD	M	SD	M	SD
Strong (3-point scale)	2,48	.55	2,79	.31	2,63	.47
Broad guidance (5-point scale)	3,88	.31	3,93	.53	3,90	.43

The mean score on the scale Powerful elements of building and construction is
2,55, and the mean score on the scale Powerful elements of hospitality is 2,39.
These scores are determined on a 3-point scale in which 1 is less powerful and 3 is
powerful. In general, the mean scores for hospitality management on the two scales
of the guidance dimension are higher than the mean scores of building and
construction.On the scale Strong, hospitality management has a mean score of 2,79
(SD=.31), whereas building and construction has a mean score of 2,48 (SD=.55) on the
same scale. These scores are determined on a 3-point scale in which 1 is less powerful
and 3 is powerful.The mean scores for hospitality management on the scale Broad guidance
in beginning is 3,93 (SD= .53), whereas building and construction has a mean score
of 3,88 (SD= 31). These scores are determined on a 5-point scale in which 1 is less
powerful and 5 is powerful. Differences between the two educational programmes
are most visible at the two dimensions; building and construction has the highest
scores on both scales of the content dimension, namely, Typifying and Powerful
elements. Hospitality has the highest scores on both scales of the guidance dimension.

Types of PLEs

The results show all educational programmes in this study are classified in terms of
PLEs based on their mean scores on the content scales Typifying and Powerful ele-
ments and the guidance scales Strong and Broad guidance in the beginning of the
questionnaire 'Powerful learning environments in vocational education' (see Table

2.5). In this study, the results show four types of PLEs can be distinguished. Furthermore, none of the educational programmes are classified as less powerful on both the content dimension and guidance dimension (i.e., on all scales). The largest group of VET programmes, a total of sixteen training programmes, are positioned as powerful on both the content dimension and guidance dimension, namely, type 1 (see Figure 2.2)
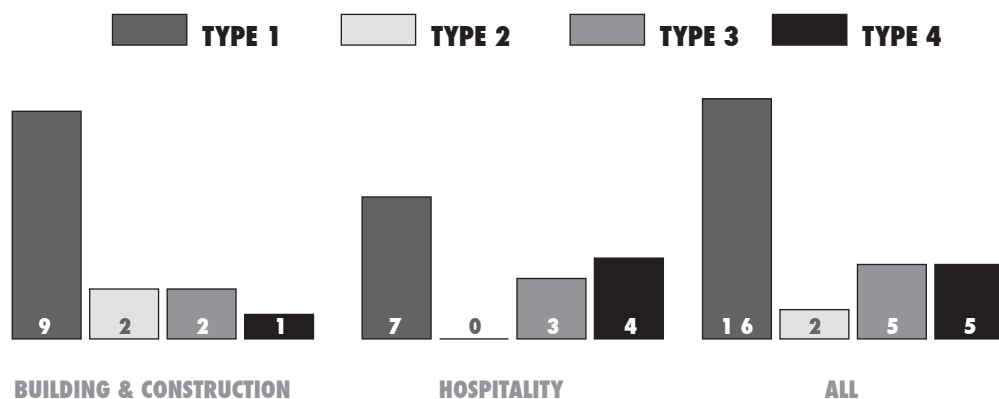
Type 1 represents learning environments which are positioned by the team-coordinators as powerful on both the content dimension and the guidance dimension, on all 4 scales (see Figure 2.2). Seven of the sixteen training programmes involved hospitality management and nine involved building and construction management. This means, the learning content of these training programmes can be characterised as action-oriented and concentrically constructed. These programmes provide a wide coverage of competences, and teachers' guidance is systematically organised and takes place in a rich context in which many different resources are provided.

Table 2.5
Four types of PLEs of Building and Construction & Hospitality

	TYPIFYING	POWERFUL ELEMENTS	STRONG	BROAD GUIDANCE
Type 1	+	+	+	+
Type 2	+	+	-	+
Type 3	-	-	+	+
Type 4	-	+	+	+

Type 2 represents learning environments that have powerful characteristics on bothscales of the content dimension, and less powerful characteristics of the structured (systematic) guidance that is offered, and powerful characteristics of the specific types of powerful guidance (i.e., both scales of the guidance dimensions) that are offered in the particular educational programme (see Figure 2.2). This means, these learning environments do offer specific types of powerful guidance. However, the guidance in general is characterised as non-systematic and is not implemented in a structured way. The results show two educational programmes of building and construction were positioned here and none of hospitality management.

Figure 2.2
Positioning the educational programmes as types of PLEs

TYPE 1   TYPE 2   TYPE 3   TYPE 4

| | 9 | 2 | 2 | 1 |
| BUILDING & CONSTRUCTION | | | | |

| | 7 | 0 | 3 | 4 |
| HOSPITALITY | | | | |

| | 1 6 | 2 | 5 | 5 |
| ALL | | | | |

Type 3 represents learning environments that have less powerful characteristics on both scales of the content dimension and powerful characteristics on the two scales comprising the guidance dimension (see Figure 2.2). Two educational programmes of building and construction and three of hospitality management were positioned here. The results suggest these educational programmes offer systematically structured guidance in a pre-designed and linear designed learning environment with an emphasis on reproductive learning.

Type 4 represents learning environments which are, overall, characterised as less powerful with respect to the four components of the content dimension (i.e., learning content, structure and range, learning environment, processing activities), and, more specifically, involve powerful elements in their design. Furthermore, these programmes offer systematically structured guidance and have powerful types of guidance implemented in their programmes (see Figure 2.2). For instance, the results suggest, a linear design of the learning environment prevails to a more concentric approach, with a systematic implementation of teachers' guidance. One educational programme of building and construction and four of hospitality management are positioned at this type.

CONCLUDING REMARKS

Two questions were at focus in this study to select a case for the overall research project in this thesis, namely, 'What types of PLEs can be distinguished in the design of the learning environments in the educational training programmes of building and construction management and hospitality management?' and 'Which of the learning environments can be considered as the most powerful learning environment?' In general, the results showed four types of PLEs were distinguished in the SSVE-programmes of building and construction management and hospitality management. None of the SSVE-programmes were classified as Less powerful on the scales of the content dimension and the guidance dimension.

The aim of this survey study on PLEs was to select a case for the stage of the thesis. Key players in the field were consulted beforehand with the goal to select innovative institutes to increase the chance of finding PLEs in the participating educational programmes. A possible explanation why the results showed not much variance in types of PLEs in the participating educational programmes, is that information was collected beforehand about the participating programmes. Both programmes were involved in similar innovations of their learning environment, and therefore, not much variance in types of PLEs was found. Furthermore, the response rate was 31%, of which 57% of the educational programmes were positioned in type 1, classified as powerful on both dimensions (i.e., the content and guidance dimension). For these sixteen educational programmes, the key players' information about the innovativeness of these educational programmes was confirmed. Further research on the other 69% of the educational programmes, which were not involved in this survey study (i.e., who did not respond to the request to participate), would be interesting to explore whether more types PLEs can be distinguished. When more types are distinguished the effects of powerful learning environments on students' vocational knowledge and how students develop this kind of knowledge can be further investigated.

A challenge of this study can be found in the scores which illustrate a relatively low distribution. Possibly, a 5- or 7-point scale might show more variation between scores. Although the jargon of some components in the instrument were already improved, it seems there is still some overlap between the different dimensions and components. Future research to improve the instrument and the quality of the questionnaire can be found in studies of Koopman and colleagues (2011) and Biemans and colleagues (2013). Nevertheless, students' learning processes in PLEs might be an interesting focus for research to further investigate. The practical relevance for educational institutes and teachers can be found in the questionnaire serving as a tool to explore the state of the art of their learning environments. With such a tool, institutes can compare their training programmes to those of others, which reflects a process of best practice benchmarking (De Bruijn et al., 2005).

Case selection

To select a case for the overall research project in this thesis, sixteen most powerful learning environments were selected first, and the team-coordinators were asked to participate in further research. In the SSVE-programmes of hospitality management, some good examples of powerful learning environments and innovative VET-institutes were found. It was decided to select one area of study because of the aim of the overall research project, namely, to conduct in-depth studies and to profoundly explore students' vocational knowledge and not to compare between students or between areas of study.

Three team-coordinators of institutes for hospitality management responded positively to the question to participate in further research, and I made visits to these institutes to observe the PLEs in real-life. One of the institutes appeared to be in a transition and reorganisation of their educational programme. Therefore, this environment was not included and the other two PLEs were selected as cases for an exploration of methods in pilot studies with the aim to explore techniques to grasp and reveal students' vocational knowledge (for a further elaboration of the exploration of methods see Chapter 6).

After the pilot studies were conducted, one of the two remaining institutes was selected as the case for the studies in this thesis. This institute was part of a large college that provided twenty-two different SSVE-programmes in the year 2014. At the institute, a practice-based learning environment was selected for the data collection of the empirical studies in this thesis. This practice-based setting was a sandwich bar run by restaurant management students and culinary chef students. The sandwich bar provided a stage within the context of the institute, where students were introduced to a wide variety of future work situations with the aim to learn relevant occupation-related competencies. It was argued, this powerful learning environment provided an appropriate context to invitee students to articulate their vocational knowledge because students were at work as practitioners in a real-life setting to learn the occupation. This means, the focus in this setting was on students' learning processes, whereas one could imagine in a restaurant for instance, the focus is on filling seats and selling meals. Hence, it was argued the sandwich bar was a stage which had the potential to grasp and reveal students' vocational knowledge.

"You can't make an omelette without breaking eggs"

TO DO SOMETHING TO THE DETRIMENT OF SOMETHING ELSE

("On ne fait pas d'omelette sans casser des oeufs", François Charette, 1796, www.wordhistories.net)

CHAPTER 3

A new cuisine

A modern style of cooking that avoids rich, heavy foods and emphasizes the freshness of the ingredients and the presentation of the dishes (en.oxforddictionaries.com).

ABSTRACT [4]

The nature of knowledge in vocational education is often described in dichotomies such as theory versus practice or general versus specific. Although different scholars now acknowledge that vocational knowledge is more than putting bits of theoretical and practical knowledge together, it is still unclear how vocational knowledge should be theorised instead. In this chapter, we theorise the idea of contextualising vocational knowledge to understand the nature of vocational knowledge and illustrate this process of contextualising with empirical examples from culinary education. We adopt an activity-theoretical focus on contextualising that involves both particularising and providing coherence. We posit a cognitive process of meaning making where meaning derives from seeing the relationships of parts to the whole. The aspects of the nature of coherence and the relation between concepts and actions seem rather underdeveloped in vocational education theory. To characterise this process at a micro-level, we enhance the activity-theoretical approach with an inferentialist one. Inferentialism offers a way to focus on reasons and inferential relations between concepts and actions that provides coherence in vocational knowledge. To characterise the broad spectrum of processes relevant for vocational knowledge, we propose the terms "conceptualising" and "concretising". Conceptualising involves inferring what follows from understanding a concept in a particular situation in relation to the meaning of other concepts. Concretising involves inferring what follows from understanding an aspect of the occupational practice in which students are participating. We argue that this way of framing vocational knowledge helps to better understand its nature and development.

INTRODUCTION

For the purpose of understanding the nature and development of knowledge in vocational education, it is not very helpful to think in terms of dichotomies such as theory versus practice, general versus specific, formal versus informal, or knowing how versus knowing that (Endedijk & Bronkhorst, 2014; Tynjälä, 2008; 2013). Many scholars acknowledge that the image of knowledge as something general acquired in education and applied in concrete situations is too simplistic to describe students' vocational knowledge development (Billett, 2014; Boersma, 2004; Eraut, 2003; Lave, 1988; Smegby & Vågan 2008). To illustrate why common dichotomies have limited power to help us understand the multifaceted nature and development of vocational knowledge, we present an episode from a cooking class in which culinary knowledge is at stake.

> *Teacher:*   *Food preservation is to make a product last longer. And why do we do that, Sam? Why did we do this in the earlier days, for example? People used to preserve a lot of food because…?*
>
> *Sam:*   *Oh yes, to make a lot and eat it whenever we want to, and to increase the shelf life?*
>
> *Teacher:*   *Yes, OK. In sum, why do we preserve food: to increase the shelf life, and, later in the year, to continue eating. Today, you are going to make and bottle your own strawberry jam. Is this an example of a preservation technique?*
>
> *Vince:*   *Yes, jam-making is one of the seven food preservation techniques.*
>
> *Teacher:*   *Go on Vince?*
>
> *Vince:*   *Well, jam contains high concentrations of sugar, and that draws water out of the food and dehydrates them so sugar acts as a means of preservation.*
>
> *Teacher:*   *Very good! Vince has paid attention. Thus, sugar acts as a means of preservation, and, furthermore, it helps to develop flavour and texture. Sugar is essential for successful jam-making.*

This episode derives from a study on students' vocational knowledge development that is part of our overall research project. Students, in their second and third year in culinary education of the four-year programme at the third qualification level (level 3 of the European Qualification Framework, European Commission, 2008), are enrolled in a 'carousel'-project that consists of theoretical classes, skills labs and occupation-related learning practices (e.g., an on-campus restaurant). This episode during skills lab, which provides students with different kinds of knowledge related to the latest kitchen technology and equipment, is an example of articulating vocational knowledge relevant for cooks. We are not concerned with the nature of the interaction between teachers and future cooks but our focus is on the nature of vocational knowledge. In the episode, the general concept of preservation techniques is linked to its purpose – to increase the shelf life – and concretised in the example of jam-making. The general effect of sugar – dehydration, that can be explained as a concept with roots in the discipline of chemistry – is linked to practical

consequences in terms of flavour and texture. Hence, vocational knowledge is subtler than thinking in common dichotomies; it is not just declarative, explicit, or abstract, but also procedural, implicit, and concrete (De Jong and Ferguson-Hessler, 1996; Winch, 2013).

Although different scholars now generally acknowledge that vocational knowledge is more than something general or abstract, or something specific or contextual, and knowledge development cannot solely be described as putting together kinds of knowledge acquired at different sites, it is still unclear how vocational knowledge and knowledge development should be theorised instead. Therefore, the purpose of this chapter is to focus on the nature of vocational knowledge and the process of contextualising in order to have an appropriate theoretical framework. We use this framework in further studies in our overall research project to empirically study contextualising by students, and hence, how students develop vocational knowledge. The theoretical framework of contextualising vocational knowledge that we will present here is informed by our attempts to understand empirical examples of contextualising, in particular by teacher-driven examples because the process of contextualising is most succinctly seen in these explicit examples. Future research should spell out these processes in students' vocational knowledge development.

We adopt the idea of contextualising as put forward by Van Oers (1998a; 1998b) from an activity-theoretical perspective. One advantage of contextualising, as we will argue, is that the focus on activities helps avoid the aforementioned dichotomies and the unhelpful view of vocational knowledge and knowledge development as putting bits of theoretical and practical knowledge together. Van Oers distinguishes two processes that are part of contextualising that he calls particularising and providing coherence. These processes involve the cognitive activity of meaning making, where meaning derives from seeing the relationships of parts to the whole rather than being composed of only the parts. What is under-theorised in Van Oers's account is the nature of providing coherence. To this end, we turn to inferentialism, a philosophical semantic theory that Guile (2014) has argued is fruitful in understanding the contextualisation of vocational knowledge.

In the following sections, we first address the nature of knowledge in the vocational domain. Secondly, we use Van Oers's (1998a) activity-theoretical account of contextualisation to ground our choice to examine the contextualisation of vocational knowledge in an attempt to better understand the nature of vocational knowledge and the processes by which it develops. Thirdly, we elaborate on the nature of providing coherence by summarising several inferentialist ideas. Fourthly, we present our theoretical framework for contextualising vocational knowledge. In the final section, we discuss the implications of the developed framework for vocational education.

THE NATURE OF KNOWLEDGE IN THE VOCATIONAL DOMAIN

There is a growing concern about knowledge and knowledge development in vocational education (Bathmaker, 2013; Guile, 2010; Wheelahan, 2010; Young, 2008). In several countries, the emphasis has long been on skill rather than knowledge (Bath-

maker, 2013; Hordern, 2014). Scholars in various countries, such as Guile (2010) and Young (2008) in the UK, Muller (2009) in South Africa, Wheelahan (2010) in Australia, and De Bruijn and Bakker (2017) in the Netherlands, have argued for the importance of knowledge, including theoretical knowledge, in vocational education. Although theoretical knowledge is often considered to be inaccessible and disengaging, and hence often avoided in vocational education, these scholars consider theoretical knowledge, both from academic disciplines and "occupationally contextualised disciplinary knowledge" (Wheelahan, 2009, p. 23), to be necessary and powerful.

With regard to the nature of knowledge in the vocational domain, Guile (2014) argues vocational knowledge develops during actions in practice. Concrete actions like actually putting sugar in the jam gains meaning through the interpretations and uses by people; this example exemplifies a process in which kinds of knowledge and actions can be interrelated. Although kinds of knowledge can be analytically distinguished, we suggest that different kinds of knowledge and actions (i.e., the appropriate use of concepts in a particular situation) have an intimate relationship with one another (cf. Billett, 2014; Guile, 2014). In the opening episode, this intimate relationship between knowledge and actions is illustrated. For example, in the act of making strawberry jam, the concept of sugar is at stake. Students may experience that, for example, cutting down on the sugar in a jam recipe is asking for failure because the jam could deteriorate. Therefore, descriptions of knowledge in isolated "chunks" are not sufficient for understanding what characterises knowledge in the vocational domain where knowledge and actions are interrelated (cf. De Jong & Ferguson-Hessler, 1996; Smegby & Vågan, 2008; Young & Guile 2003).

Following from the view that knowledge and actions have an intimate relationship, students in vocational education should be introduced to situation-specific conglomerates of different kinds of knowledge because they are required to get access to the knowledge that underpins actions in practice. Knowledge is embedded in occupational practices (Wheelahan, 2009), and practitioners use disciplinary knowledge (e.g. chemistry, mathematics, biology, et cetera) and transform it into applied disciplinary knowledge or occupationally contextualised disciplinary knowledge as part of their practice (Young, 2006). In the opening episode, the student's judgement, that one of the effects of sugar in jam-making is dehydration, and therefore sugar acts as a means of preservation, can be explained by means of concepts from the disciplines of chemistry and biology. An understanding of the chemical processes like an understanding how foods and flavours develop under different conditions and temperatures, is essential for routine cooking. Although students are not required to know everything about chemistry and biology, they should know about aspects of these disciplines relevant for cooking. Hence, students should have access both to contextually specific knowledge in occupational practices and to wider systems of meaning in which this knowledge is embedded.

In sum, vocational knowledge is the knowledge required for practising an occupation (knowledge displayed in action), or embodied in an occupation (knowledge used and transformed by people, tools, and specific occupational practices). We characterise vocational knowledge as a configuration of all kinds of knowledge required to adequately function as a practitioner in a vocation in which knowledge is embodied in the practises, people, and tools that belong to that vocation (Billett, 2006; Eraut, 1994; 2004; Schaap, et al., 2009;

Young & Guile 2003). Having defined our object of study, in the next section we describe what characterises the development of vocational knowledge. We first briefly describe the shift in theories on vocational knowledge development – from transfer to participation to contextualising – in order to introduce our framework for contextualising vocational knowledge.

A shifting view

In theories on vocational knowledge, the perspective on knowledge as an abstract representation that can be decontextualised from its context of origin and applied in another context (i.e., knowledge-transfer between situations) has been around for more than a century (for historical overviews of transfer research, see Beach, 1999; Bransford & Schwartz, 1999; Lobato, 2006; Tuomi-Gröhn & Engeström, 2003). In these theories of transfer, knowledge development is primarily being viewed as a cognitive activity; the focus is on knowledge development "in" or by individuals. Compared to previous theories on transfer, new perspectives on knowledge development shifted the view from the individual learner to the learner as a participant in a cultural community (Vygotsky, 1978; Wertsch, 1985; 1998). For example, Lave and Wenger (1991) argued that the idea of transfer could be replaced by the idea of participation: all forms of knowing emerge from participating in social practices. They argue that rather than to replicate in a new situation what has been taught elsewhere, people use different resources – conceptual, material, and social – as a way to engage with and evolve forms of occupational practice. Knowledge is situated within communities of practice (i.e., a community of practice is formed by people who engage in a process of collective learning in a shared domain of human endeavour) rather than being something that exists "out there" in books (Lave & Wenger 1991).

In the shift from transfer to participation, the attention paid to knowledge and knowledge development in the vocational domain has been reduced (Guile, 2010). Because Lave and Wenger (1991) build their argument about apprenticeship as a model of learning through a focus on traditional rather than modern apprenticeships, the contribution of educational settings in which apprentices develop knowledge is minimised (Gamble, 2006; Wheelahan, 2010; Young, 2000). As a helpful way to restore the attention to vocational knowledge, and to do justice to Lave's insights on knowledge in practice, Guile (2014) proposes to turn to the recent Hegelian reading of Vygotsky. Although Vygotsky, like Lave, argued that all forms of knowledge are created through social practices (Derry, 2013; Edwards, 2010), the crucial difference is that Vygotsky draws attention to knowledge and knowledge development by recognising the ways in which social practices are responsible for generating different kinds of knowledge that are evidenced in the different types of concepts used. Concepts can involve "everyday" and "theoretical" concepts, that is, ideas of what something is or how it works, and Vygotsky emphasises their intimate relationship (Edwards, 2010; Guile, 2010). Hence, Guile's interpretation of Vygotsky's perspective of vocational knowledge is underpinned by a very contextual understanding of the development of knowledge.

In this chapter, we argue that vocational knowledge is the ability to appropriately use and justify the use of concepts. Vocational knowledge is evidenced by the use of different concepts, and therefore, someone has knowledge of a subject if she or he has mastery over related

concepts. We propose the development of vocational knowledge consists in the growing understanding of the uses of different concepts. Van Oers (1998a) reinterpreted Vygotsky's (1987) idea about the relationship among concepts, learning, and action in his theory of contextualising knowledge that provides a helpful way to characterise students' vocational knowledge development. Van Oers described that to use a concept in a new and different context means to use that concept in a different manner. We might, for example, use a knife in the kitchen to chop onions or use it to rob a bank. By using it differently, our perspective on that concept changes, as well as the meaning of the concept, which is consequently redesigned to better fit its purpose in the new context. Hence, to focus on the nature of vocational knowledge as a process of contextualising, suggests that we study the functions of context, notably particularisation and providing coherence, in terms of the dynamical features of activity systems and the embedded process of the emergence of meanings (Van Oers, 1998a).

Particularisation of meaning in Van Oers's (1998a) theory is the cognitive process of meaning making, and providing coherence is deriving meaning from seeing the relationships of parts to the whole rather than being left with only the parts. To illustrate this, we return to the cooking example. When a student appropriates the concept of ratio in the context of a meaningful activity of jam-making, the concept of ratio will probably be linked to other meaningful concepts, such as units of measurement, quantities, proportion, flavour, texture, consistency, et cetera. The student is then required to tie different concepts and actions together, as a result of which the concept of ratio will be more than just a formula that is used in a particular situation (particularisation or meaning making). Context making prevents the particularised meaning of ratio from being isolated as it brings about coherence with a larger whole (providing coherence).

Van Oers's (1998a; 1998b) idea of contextualising promises to be useful in the vocational context, but in his argumentation, the aspects of the nature of coherence and the relation between concepts and actions are rather underdeveloped. Therefore, we propose to enhance his theory to gain a deeper understanding of what characterises the process of contextualising vocational knowledge. We found a promising theoretical framework in inferentialism. To describe in more detail the micro-level process of contextualising vocational knowledge, we consider the way in which the philosopher Brandom (1994) uses the ideas of "inference" and "webs of reasons" to be useful. In the next section, we introduce these philosophical ideas so we can present our framework for contextualising vocational knowledge, in particular what it means to provide coherence.

An inferentialist approach towards vocational knowledge

Inferentialism is a philosophical theory of meaning that allows us to analyse what it means to make judgements and take action (i.e., the appropriate use of concepts in a particular situation) in close relation to each other. For Brandom (1994), judgements and actions are the minimal units for which human beings are responsible: One of [Kant's] cardinal innovations is the claim that the fundamental unit of awareness or cognition, the minimum graspable, is the judgement. Judgements are fundamental, since they are the minimal unit one can take *responsibility* for on the cognitive side, just as actions are the corresponding unit of responsibility on the practical side. Applying a concept is to be understood in

terms of making a claim or expressing a belief. The concept concept is not intelligible apart from the possibility of such application in judging (Brandom, 2000, pp. 159–160, emphases in the original).

Inferentialism provides us a language and theory of how coherence is established between different concepts, and also between concepts and actions. Hence, rather than focusing on analytic distinctions between kinds of knowledge or different concepts involved in vocational knowledge, inferentialism offers a way to focus on reasons and inferential relations between judgements and actions.

Reasons are relational: a judgement can be a reason for an action or another judgement, and an action can be the reason for a judgement or another action. For example, the judgement that sugar helps to preserve jam is one of the reasons to use sugar when making jam. Why sugar helps to preserve jam can be explained with knowledge from several disciplines such as chemistry and biology. Why we want to preserve jam is connected to practical reasons: to increase the shelf life of jam so we can eat it later in the year, but also to make it taste and look good. The vocational knowledge centred around jam-making is, hence, the ability to make the appropriate inferences: to use concepts appropriately and to justify the use of them. This involves responsiveness to the various reasons involved, which can post hoc be distinguished analytically as predominantly practical or theoretical, but which are in any concrete situation intimately related, or as Guile (2014, p. 6) would put it, "commingled."

One attractive feature of inferentialism is its pragmatist view of knowledge. For Brandom:

> To grasp or understand (…) a concept is to have practical mastery over the inferences it is involved in – to know, in the practical sense of being able to distinguish, what follows from the applicability of a concept, and what it follows from (Brandom 2000, p. 48).

As Bakker and Derry (2011) conclude, concepts should be understood in their inferential role. Mastery of the concepts related to jam and jam-making includes mastery of the inferences involving related concepts as far as they are relevant to jam and jam-making (sugar, preservation, shelf life, taste, structure, et cetera.). This way of thinking is in line with Vygotsky (cf. Derry, 2008; Edwards, 2014), because he sought the psychological equivalent of the concept not in general representations, but in a system of judgements in which the concept is disclosed (Vygotsky 1998).

Concepts are embedded in wider systems of inferences that are part of the vocational knowledge domain. These systems are not abstract systems; they are intricately connected to practical situations. Therefore, vocational knowledge development involves gaining familiarity with these wider sets of inferences and thereby a deeper understanding of the concept in everyday practice (Derry, 2008; Edwards, 2014). This implies Brandom's inferentialism is holistic: "one cannot have any concepts unless one has many concepts. Thus, the content of each concept is articulated by its inferential relations to other concepts. Concepts, then, must come in packages" (Brandom, 2000, p. 15–16). Bakker and Derry (2011) concluded that when people reason with any concept, they also draw on its inferential relations to other concepts.

Systems of inferences can be thought of as "webs of reasons". Bakker and Derry define

these as "the conglomerates of interconnected reasons, premises and implications, causes and effects, motives for action, and utility of tools for particular purposes that have rational impact in a particular context" (2011, p. 10). Thinking in terms of such webs helps us to focus on any reason relevant in a situation, whether an action or a judgement (or emotion, but we focus here on action and judgement). Although people are not always consciously aware of the webs of reasons in a particular context, these reasons still impact their work. Therefore, students should be inducted into relevant applications of concepts, and hence meanings, through activities with others within a particular practice.

Brandom's inferentialism may come across as rationalistic because of his focus on making things explicit (1994) and articulating reasons (2000). It does not have to be interpreted as such. He considers responsiveness to reasons a feature of human beings. These reasons do not have to be explicitly in a linguistic form, as exhibited by McDowell's (1996; 2013) careful avoidance of an overly rationalistic or mentalistic interpretation of reasons. The ideas of inference and webs of reasons within pragmatist philosophy help us understand the aforementioned issue of coherence in more detail. What creates the coherence among judgements, actions, and emotions, and among knowledge elements of very different natures, are the inferences and webs of reasons involved in knowledge-based actions within a vocation. With these insights, we are now ready to present our framework for contextualising vocational knowledge.

Contextualising vocational knowledge: conceptualising and concretising

The term "contextualising" may have the connotation of bringing something abstract into context, but in line with Van Oers (1998a), we do not restrict its meaning to concretising alone. Rather, we see bringing any judgement or action into a more conceptual context as a form of contextualising as well. Hence, we use the term "contextualising" in a broader sense than some readers may be used to. For example, where some authors write about decontextualisation, we prefer to avoid this term. As Van Oers (1998b) notes, this is a non-informative term about what is not going on. Moreover, what is sometimes meant by decontextualisation is in our view a particular form of contextualisation: bringing ideas into a more conceptual disciplinary context. For us, contextualising also incorporates recontextualising. By using the more general term contextualising we aim to avoid the question of what is reconceptualised and how this initially emerged. The advantage of this view is that "contextualising vocational knowledge" hence covers a broad spectrum of commingled processes that seem relevant in using and developing vocational knowledge without falling prey to dichotomisation.

To perceive the nature of vocational knowledge as the process of contextualising vocational knowledge suggests students must learn to recognise contexts and to use concepts appropriately. Furthermore, they also should to learn to relate the general to particular situations, and to different kinds of situations. Since not all knowledge students require to use emerges from practice, they require the means to move beyond contextually specific applications of knowledge in order to access systems of knowledge and their generative principles (Young, 2007). Students should be inducted in the webs of reasons at stake in particular contexts to learn the relevant applications of concepts, and hence, meaning. Our inferentialist perspective on vocational knowledge development suggests contex-

tualising vocational knowledge involves gaining familiarity with wider sets of inferences that are part of the vocational domain. These wider sets of inferences can be pictured as webs of reasons that include any reason relevant in the situation. Vocational knowledge is the ability to make the appropriate inferences relevant to the occupation, that is, to use and justify the use of concepts appropriately. Concepts are embedded in wider systems of inferences that are part of the vocational knowledge domain. Hence, what creates coherence between different concepts, and also between concepts and actions, are the inferences and webs of reasons involved in any knowledge-based action in a vocation.

By unpacking concepts through their inferential relations suggests concepts are not abstract representations but systems of inferences with norms of what counts as valid, situated in occupational practice. Students gradually master more and more appropriate inferences involved in using particular concepts in relation to other concepts, in relation to more and more possible appropriate actions. In the opening episode on dehydration for example, although students are not required to understand all the chemical and biological webs of reasons around the concept, they are required to know in this concrete example that sugar absorbs water with the effect that microbes cannot as easily grow because they require a high-moisture environment. We propose that it is by learning about more and more inferences that students develop vocational knowledge.

Our framework can be summarised as follows. To characterise the spectrum of processes relevant for contextualising vocational knowledge, we propose the terms "concretising" and "conceptualising". Concretising involves inferring what follows from understanding an aspect of the occupational practice in which students are participating. This involves understanding how to interpret a particular situation and how to transform and use concepts appropriately. The main reason for concretising is to make a general or key concept better understood, to do justice to local circumstances, and, typically, to act. Conceptualising means inferring what follows from understanding a concept in relation to other concepts. This involves understanding what a concept means in a particular situation in relation to the meaning of other concepts. The main reason for conceptualising is to increase the understanding of concepts by inferentially relating them to other concepts. Together the processes of concretising and conceptualising allow students not only to express understanding, ideas, and arguments in accordance with systems of meaning and generative principles, but also to use something in a new way and in a new situation. We argue that for students to make things explicit and articulate reasons is key in the process of learning how to recognise and use vocational knowledge that is required in occupational practice.

To illustrate our theoretical framework of contextualising vocational knowledge, we return to the opening episode of this chapter. An example of concretising is to mention jam-making as an example of the more general technique of preservation. Another example of concretising in the act of jam-making of gooseberries, is understanding that gooseberries, unlike strawberries or raspberries, require to be lightly poached before adding sugar. An example of conceptualising is to explain what sugar does in the preservation technique of jam-making in terms of dehydration, and what happens in chemical and biological terms. A teacher or student may point out that creating a lower pH value and binding available water makes it is more difficult for micro-organisms to develop so that the jam will not deteriorate so fast. Another

example of conceptualising is to explain that poaching is a moist-heat cooking technique to soften the skin of gooseberries. Once the sugar is added, the skin will not soften because of dehydration by means of sugar. The relatively low temperatures used in poaching are particularly suitable for delicate foods like gooseberries because gooseberries might easily fall apart.

What makes different concepts and actions cohere are the inferential relations between them (i.e. why something is done and why this fits the purpose). To emphasise that we consider contextualisation to be a spectrum spanning both conceptualising and concretising, we note that it is not always clear whether reasons are predominantly theoretical or practical. For example, there is an inferential relation between the action of using a preservation technique and the purpose of increasing jam's shelf life – one is a reason for the other. The action of adding sugar not only increases the jam's shelf life, but also has – as an additional reason – the purpose of improving the flavour and texture of the jam. One could justifiably argue that increasing shelf-life and improving flavour and texture are practical reasons. However, shelf-life, flavour, and texture are also general concepts with a much wider scope than jam-making. Hence, increasing shelf-life can be done in different ways for different foods (e.g., pickling little cucumbers or smoking salmon). When focusing on these concepts more generally, the orientation is predominantly on understanding rather than immediate action.

A second illustration of our theoretical framework can be found in the next empirical example from a cooking class derived from the previously described overall research project on students' vocational knowledge development. The focus, like in the opening example, is on the nature of contextualising, which can be found in the articulations of the teachers as an example of the kind of contextualising process we would like students to engage in. Again, we are not interested in the nature of interaction but in the process of contextualising. How students actually contextualise vocational knowledge is object of another, empirical study. In this example, the teacher presents students with knowledge tailored to concrete situations.

Teacher: *Think of salmon, salmon swim in a given season. Then you have a lot of salmon, a salmon abundance. The salmon is caught and preserved. And then we are able to …? At times when there is no salmon? To eat it. Another simple example is our pickle. Because a pickle is a preserved something, right? What was a pickle before? …Silence…A little cucumber. And the French name of this little cucumber?*

Sam: *… chorni…*

Teacher: *Cornichon. And cornichons, those little pickles, in which season do they grow again? Ben?*

Ben: *August and September.*

Teacher: *Yes, then there are lots of small cucumbers and we pickle the little cucumbers. Pickling is a preservation technique, right? We will make a marinade, an acidic marinade, and we pour that on the cucumbers, so we have preserved pickles. And we can eat them all year round. We are doing the same here in school, right? Exactly the same. Today,*

you are going to make and bottle your own strawberry
jam. Is this an example of a preservation technique?

One of the remarkable aspects in this example of the teacher and students' contextual-isation of vocational knowledge is the continuous evolution into new types of inferential relations resulting from the continuous stream of questions that the teacher puts forward or encounters. Even though educational scholars may criticize the interaction pattern evident in the episode (initiate-response-evaluate), it illustrates how the teacher tries to provide coherence in implying inferential relations of preservation techniques, examples of preserved foods, the purpose of preservation, et cetera. The teacher constantly con-ceptualises and concretises when he illustrates the concept of preservation with reasons why to preserve food, both with concrete examples (e.g., salmon, pickles) and with the purpose of preservation techniques (e.g., increase the shelf-life, eat them all year round).

A growing understanding of vocational knowledge and the process of contextualising

This chapter has set out to provide a theorisation of what characterises contextualising vocational knowledge, and to illustrate this framework with examples from culinary education. We have used Van Oers's (1998a; 1998b) activity-theoretical account of contextualisation to examine the contextualisation of vocational knowledge and argued that contextualising for us involves both concretising and conceptualising. Concretising involves inferring what follows from understanding an aspect of the occupational practice in which students are participating. Conceptualising presup-poses inferring what follows from understanding a concept in relation to another concept and understanding what a concept means in a particular situation in rela-tion to other, more general concepts. These two processes may, in some cases, be inextricably connected. What makes the different concepts and actions cohere are the inferential relations between them as part of webs of reasons. In this way, con-textualising vocational knowledge leads to a growing understanding of how complex and interdisciplinary bodies of knowledge fit together, and how practitioners can decide what knowledge is relevant for a particular purpose or in a specific situation.

With inferentialism we have tried to offer a precise language to talk about the intrinsic connections between concepts embedded in wider systems of inferences and practical situations. By unpacking concepts through their inferential relations shows that concepts are not abstract representations but systems of inferences with norms of what counts as valid, situated in practices. So, students learn to master concepts bit by bit, being able to make more and more appropriate inferences with the accompanying term in relation to other concepts, in relation to more and more actions, et cetera. Hence, this view on the nature of vocational knowledge emphasises the appropriate use of concepts and explains the inferential relations of these concepts in terms of the ability to explain and justify to others the reasons for what you say or do. Although there is potential to broaden the focus to affective issues such as emotion and identity — a cook may take pride in knowing about the

history of potatoes — the role of affect was not our primary concern in this chapter.

Inferentialism as interpreted in this chapter is compatible with Vygotsky's ideas (Derry, 2008), while it has a precise account of the use and content of concepts. It may assist in bridging between the more cognitive approaches on knowledge and concepts on the one hand, and sociocultural approaches on the other. Our inferentialist perspective on the nature of vocational knowledge suggests that any historically developed disciplinary knowledge domain (e.g. mathematics, chemistry, cooking) can be taken seriously (Wheelahan, 2010; Young, 2008), while keeping an eye on the practical relevance of vocational knowledge for students. That is, inferentialism takes the historically developed knowledge seriously as something that students should appropriately apply in particular ways so that they are useful in vocational settings and tasks. At the same time, this perspective highlights the webs of reasons of which students should become aware. These webs include a range of reasons, such as the purpose and relevance of particular actions, techniques, et cetera.

We have avoided the term decontextualizing because a more helpful view is that people can make inferences in which they temporarily ignore contextual information which has no or little influence on the validity of the inference. This does not mean that context is not important or neglected but that it does not influence the validity of inference as in adjusting a recipe, for example when changing the quantities of ingredients but not the ratios between these quantities. In our case, seemingly simple examples about cooking may involve knowledge about food and food preparation but also from biology, chemistry and mathematics, though not at an abstract level. Where a chemistry teacher may focus on elaborating webs of reasons around a scientific phenomenon such as dehydration, a cooking teacher may focus on the unique webs of reasons relevant to preservation techniques. These webs can be considered conglomerates of many different types of reasons that we can analytically distinguish as predominantly practical (e.g., to increase shelf life) or theoretical (e.g., that in acidic environments microbes cannot live), and stemming from different disciplines (e.g. biology, chemistry, mathematics et cetera).

The reader may object that students or practitioners might not be aware of the reasons they have for doing particular things (cf. Harteis & Billett, 2013; Schear, 2013). However, as Guile (2014) observes, doctors make conceptually-structured professional (i.e., practical) judgements in context-specific circumstances. These judgements are often implicit or tacit in nature: They occur in the flux of working in a hospital or in general practice without explicit verbalisation. This does not mean, however, that doctors are unable, if pressed, to articulate reasons for their diagnosis and subsequent course of action.

Our theoretical framework and empirical illustrations of contextualising vocational knowledge provide an elaboration of existing theories of contextualising (Van Oers, 1998a; 1998b) that we enhanced with inferentialism. We argued that contextualising vocational knowledge leads to a deeper understanding of the intimate relationships between concepts and actions, and the relevance of vocational knowledge for a particular purpose or in a specific situation. In this chapter, we could only speculate on students' vocational

knowledge development, on what it looks like, and what it requires from students and curricula. In our overall research project, these processes will be further substantiated with empirical studies on students' knowledge development in culinary education.

"Know your onions"

TO KNOW (ONE'S STUFF), TO BE VERY KNOWLEDGEABLE OR SKILLED IN SOME AREA
(idioms.thefreedictionary.com)

CHAPTER 4

Food preparation, cooking and service

ABSTRACT [5]

How students develop vocational knowledge is a rather under-researched topic in the context of vocational education and training. Vocational knowledge is perceived as the kind of knowledge required to perform in occupational practice. From an activity-theoretical approach to learning, supplemented with ideas borrowed from inferentialism, this chapter explores how students develop vocational knowledge in terms of a cognitive activity of contextualising. A qualitative in-depth study is presented which explores students' cognitive processes during performance in occupational practice. Hospitality students and culinary students were interviewed and asked to articulate the process of contextualising during their work in a sandwich bar. A detailed description of the characteristics of contextualising is presented, and the process is illustrated with examples from the data.

CHAPTER 4

INTRODUCTION

I n recent years, the concept of vocational knowledge has become topic of many debates in educational sciences (Bathmaker, 2013; De Bruijn & Bakker, 2017; Khaled, Gulikers, Biemans, & Mulder, 2014; Lindberg, 2003; Nore & Lahn, 2014; Tynjälä, 2013; Young, 2013; Zitter, Hoeve & De Bruijn, 2016). In these debates, vocational knowledge is often discussed from a curriculum point of view, for instance, what teachers and educators intend for students to learn as laid down in curricula (Kilbrink, Bjurulf, Olin-Scheller, & Tengberg, 2014; Wheelahan, 2010; Winch, 2013). Or students' vocational knowledge is discussed in terms of the differences between school-based learning and workplace-learning (Aprea & Sappa, 2015; Bakker & Akkerman, 2014; Tynjälä 2013). Much less focus in these debates is on vocational knowledge from a learners' point of view, namely, how students develop vocational knowledge. Furthermore, there is hardly any empirical evidence how students develop vocational knowledge, namely, the kind of knowledge required to perform in occupational practice.

In the process of becoming autonomous practitioners, students are required to develop vocational knowledge, and therefore, they are required to gain access to the thousands of concepts, procedures, principles, rules, skills, and patterns which are present in the occupation-specific field of practice. Each situation in occupational practice challenges practitioners to use different compositions of knowledge (Guile, 2014). Therefore, vocational knowledge may be perceived as all kinds of knowledge required for practising an occupation and is characterised by knowledge that comes in specific conglomerations at the service of an occupation (Heusdens, Bakker, Baartman & De Bruijn, 2016). It is displayed in action, and embodied in the practices, people, tools and instruments that belong to an occupation-specific field of practice (Wheelahan, 2010; Young, 2006).

To gain access to vocational knowledge, students are required to learn to recognise knowledge in occupational practices and develop an understanding of the relevance of knowledge for a purpose or in a specific situation (Billett, 2014; Guile, 2014). For that reason, Wheelahan (2015) suggests students should gain access to knowledge underpinning action in practice. For instance, when students learn to caramelise onions for a French onion soup, additionally they are required to learn how the caramelisation of onions can be explained as a concept with roots in the discipline of chemistry. Hence, when students learn to anchor their experiences into wider systems of meaning, they learn to go beyond their individual experiences to locate themselves and their experiences into a broader context (Bakker & Derry, 2011; Wheelahan & Moodie, 2011).

This chapter aims to explore how students develop vocational knowledge and therefore answers the research question: "How do students develop vocational knowledge during performance in occupational practice?" Investigating the cognitive processes by which students develop vocational knowledge contributes to insights into the complex nature of vocational knowledge and is necessary to improve our understanding of learning processes in the context of VET. However, to explore students' cognitive processes with the aim to understand how students develop vocational knowledge, the nature of students' vocational knowledge must be determined first. In a former study, the idea to think about the nature of students' vocational knowledge in terms of an ongoing process of contextualising was introduced (see Heusdens et al., 2016). The activity of contextualising serves as the conceptual frame of the study presented in this chapter and explains what it means to understand students' vocational knowledge in terms of an ongoing process.

To grasp and reveal the abstract concept of contextualising in practice, students were invited to reflect in and on real-time action. In the method section, we explain how students' cognitive processes during occupational practices were revealed to gain insight into how they develop vocational knowledge. In the result section, the process of contextualising is characterised and illustrated with examples from the data. This chapter finalises with some concluding remarks, a discussion of the challenges of the study and directions for future research.

Developing vocational knowledge

In a traditional theory of transfer (see e.g., Beach, 1999), knowledge development is primarily viewed as a cognitive activity, namely, an individual acquisition of "something". These theories seek to explain the processes of how individuals acquire knowledge, and knowledge is objectified in the individual mind. Knowledge has the connotation of being possessed by the individual or as a commodity (Elmholdt, 2003). In response to this traditional conceptualisation of transfer, situated approaches to knowledge development shift the view from the isolated learner to the learner as a participant in a cultural community (Berner, 2009; 2010; Elmholdt, 2003; Jonasson, 2014; Tanggaard, 2007; Vygotsky, 1978). This means, all forms of knowing emerge from participating in social practices, and therefore, knowledge is an aspect of practice, discourse and activity (Lave & Wenger, 1991).

Although different scholars nowadays acknowledge the development of vocational knowledge is more than putting bits of theoretical and practical knowledge together, there is still no consensus among educational scientists how to theorise the nature of vocational knowledge in less dichotomous or dualists ways (Billett, 2014; De Bruijn & Bakker, 2017; Guile, 2010; Schaap, et al., 2009). Thinking in dichotomies such as school versus workplace or general versus specific, is not a helpful way to understand the complex nature of vocational knowledge. Furthermore, a rather under theorised aspect of vocational knowledge is the extent to which knowledge and action are sometimes related, and how knowledge (and language) is spread throughout occupational practices. To do justice to the complex nature of vocational knowledge, a more unified and inclusive way of thinking about the nature of students' vocational knowledge is necessary to explore how students develop vocational knowledge.

In an earlier study, an inclusive way of thinking about the nature of students' vocational knowledge was introduced in which students' vocational knowledge is conceptualised as a cognitive activity of contextualising (Heusdens et al., 2016). The idea of contextualising as presented by Van Oers (1998a; 1998b) was introduced and supplemented with inferentialism, a philosophical semantic theory of meaning. Inferentialism offers a language and theory to gain a deeper understanding of contextualising (Bakker & Derry, 2011; Brandom, 1994; 2000). In the next section, the activity-inferential approach to students' learning is shortly presented. For a more detailed explanation of this theory, we refer to our previous study (Heusdens et al., 2016).

The activity of contextualising

Van Oers' theory of contextualising (1998a; 1998b) is grounded in sociocultural the-ory in which activities – specifically the cognitive activity of meaning making – are emphasised. Van Oers argues to use a concept in a new and different context means to use that concept in a different manner. By using a concept differently, our interpreta-tion of the concept changes, and therefore, the meaning of a concept is consequently redesigned to better fit its purpose in a new context. Through context making (i.e., contextualising) concepts and actions are tied together. Therefore, contextualising prevents the particularised meaning of a concept from being isolated, as it brings about coherence with a larger whole. This means, meaning derives from seeing the relationships of parts to the whole rather than seeing only the parts (Van Oers, 1998b).

To describe in more detail how students provide coherence between what they know and how to act, and hence, to understand the micro-level processes of contextualising, Van Oers' (1998a; 1998b) activity-theoretical approach of contextualising was supple-mented with an inferential perspective on learning (Brandom, 1994). Inferentialism is a philosophical theory of meaning that offers a way to focus on what it means to make judgements and take action in close relation to each other (Bakker & Derry, 2011; Brandom, 2000). The inferential perspective taken on learning in this chapter focuses on reasons and inferential relations between judgements and actions. Unpacking con-cepts through their inferential relations shows concepts are not abstract representations.

Concepts are systems of inferences which have norms of what counts as valid, situated in practices. For instance, when a culinary chef asks his student why she is still stirring the onions for the French onion soup, this student responses she is still stirring to develop a rich and tender taste. For a rich and tender taste, onions should be caramelised and cooked until golden brown. The abovementioned example illustrates how meaning is a matter of how a judgement (i.e., an expression of knowledge) is used. Furthermore, the meaning of a concept is constituted by rules and norms governing inferences that people might make involving that concept (Noorloos, Taylor, Bakker & Derry, 2017).This means, every time one speaker (e.g., a student) makes a claim, it is up to others (e.g., a culinary chef) to assess whether the claim is justified. Therefore, an inferential approach to knowledge development might be perceived as a participatory activity of reason-giving (Noorloos et al., 2017).

In sum, in an activity-inferential approach to learning, students' vocational knowledge development is perceived as a cognitive activity of reasoning in terms of concept for-mation. Contextualising emphasises the appropriate use of concepts, and explains the inferential relations of these concepts in terms of the ability to explain and justify to others the reasons for what you say or do. Therefore, an activity-inferential view on the nature of students' vocational knowledge explains how students learn to master concepts bit by bit, how they learn to make more and more appropriate inferences in relation to other concepts and in relation to more and more actions. What makes different concepts and actions cohere are the inferential relations between them.

A broad spectrum of reasoning activities

To grasp and reveal the abstract concept of contextualising in practice, two perspectives are analytically distinguished: "conceptualising" and "concretising" (Heusdens et al., 2016). These two perspectives together cover a broad spectrum of reasoning activities relevant for the development of vocational knowledge. Conceptualising involves inferring what follows from understanding what a concept means in a situation in relation to the meaning of other concepts. Concretising is about understanding the use of concepts in a situation. It involves inferring what follows from understanding an aspect of occupational practice in which students are participating and inferring how to interpret that situation to transform and use concepts appropriately.

Together the reasoning activities of concretising and conceptualising allow students to express understanding, ideas, and arguments in accordance with systems of meaning and generative principles, and to use concepts in new ways and in new situations (Wheelahan, 2015). The main reason for conceptualising is to increase the understanding of concepts by inferentially relating them to other concepts, which leads to a deeper understanding of a concept through seeing it in the context of a greater whole. The main reason for concretising is to make a general or key concept better understood, to do justice to local circumstances, and, typically, to act.

The reasoning activities of conceptualising and concretising are complementary, and in some cases, inextricably related (Heusdens et al., 2016). For instance, one might justifiably argue "to improve flavour" is a practical reason. Simultaneously, flavour is a general concept with a much wider application than preparing onion soup. Therefore, when focusing on concepts more generally, the orientation is predominantly on understanding rather than on immediate action. Since it is not always clear whether reasons are predominantly theoretical or practical, we therefore suggest contextualising vocational knowledge covers a broad spectrum of inextricably related activities that seem relevant in using and developing vocational knowledge.

METHODOLOGY

The type of research presented here is a qualitative, exploratory in-depth study of how students develop vocational knowledge. The process of contextualising is explored in terms of how students articulate multiple (relevant) reasons for their actions (i.e., expressions of knowledge). The presented theory of contextualising focuses on concept formation, and suggests vocational knowledge develops when students learn to infer from the meaning of one concept to the meaning of other concepts. Therefore, the study focuses on the cognitive dimension of knowledge development, and intuition and affect issues such as emotions and identity are not considered.

Setting

The study is set in an entrepreneurial learning environment at an institute for hospitality and restaurant management and culinary arts in the Netherlands. The institute was selected based on a previous study in which potentially powerful learning environments were identified

(Heusdens, Baartman & De Bruijn, 2012). In the selected powerful learning environment, students learn, work and practice together in real life mini-enterprises. In such practice-based settings, students gain hands-on experiences under the guidance of a teacher or a team of teachers, and they are introduced to the knowledge of their future occupations. It was hypothesised that in the selected setting, the participating students are challenged to develop vocational knowledge since they are introduced to a wide variety of aspects of their future occupation.

The selected learning environment was a realistic counter-service catering company part of the on-campus restaurant and called "the sandwich bar". In the sandwich bar, the participating students prepared and sold drinks and sandwiches. Customers were served ready to eat and pre-packed sandwiches at a fast-track corner, or they could create their own sandwiches at a slow-track corner. The ingredients for the sandwiches were prepared in the on-campus restaurant's kitchen.

Participants

The sandwich bar was run by a group of management students and culinary students aged between 17 and 22 during their vocational training in 2014-2015. The participating students were enrolled in a school-based learning route with fulltime education. The group of management students (n=56) were in their second and third year of the four-year programme of hospitality and restaurant management, at the highest qualification level in a school for SSVE (level 4 of the European Qualification Framework, European Commission, 2008). These students were trained to become hotel or restaurant owners or managers. The group of culinary students (n=72) were in their first and second year of training for culinary chef at the school of culinary arts, a three-year programme at the third qualification level at the same SSVE-school school (level 3 of the European Qualification Framework, European Commission, 2008). These students were trained to become kitchen professionals for a wide variety of work settings in the hospitality industry.

Every six weeks, a group of six management students and two culinary students were responsible for managing and promoting the sandwich bar. The structure of thegroup of students varied every week because each student received an individual educational track. The management students rotated in different roles, namely, general manager of the enterprise, service-manager in the sandwich bar, or executive chef in the kitchen.The culinary students were supervised by the management students and were responsible for preparing, cooking, and presenting the food.

A mixed group of management students and culinary students was selected for this study because together these students were assigned to run the business, and they were challenged to develop different kinds of vocational knowledge. For instance, compared to the culinary students, management students are required to develop vocational knowledge at a more abstract level because of their higher level of training. Before the data collection, the management students had already received an intensive programme of both theoretical classes and practical training, while the culinary students already had been presented with a lot of practical training in a skills lab, and they had been introduced to basic cooking techniques and procedures. More than half of the participating group of students had

part-time jobs in the hospitality industry, and therefore, they had been introduced to some vocabulary and vocational knowledge relevant for the occupation-specific field of practice.

Data collection
Procedure of the pilot study

A pilot study was conducted to select the most suitable method to reveal how students develop vocational knowledge. The pilot study covered four days of video-recorded interviews in which students were invited to reflect in and on real-time action (Schön, 1983) at two institutes of hospitality management and culinary education in the Netherlands. In both institutes, the practice-based settings were student-run establishments, namely, a sandwich bar and a lunchroom, which were both part of the institutes' on-campus school restaurants. The methods of reflection in and on real-time action were selected because they allow the investigation of cognitive processes through inviting participants to recall their concurrent thinking during an event, or when prompted by a video sequence (Fox-Turnbull, 2011). Furthermore, in previous research such techniques proved to be worthwhile to invite participants to articulate their thinking (Fox-Turnbull, 2011; Schön, 1983; Van Kan, Ponte & Verloop, 2010).

Reflection in and on action is a method to reveal a mixture of what students know and how they act, described by Schön (1983) as "theory-in-use". The method of reflection in real-time action involves interviews in which students are invited to reflect on their actions at the time of an event or interaction. The method reflection on real-time action involves stimulated recall interviews, in which students are asked to reflect on their action based on video-recordings of their performance in occupational practice. The video-recordings are used as cues to invite students to reflect on and articulate reasons for their actions (cf., Van Kan et al., 2010).

In the pilot study, the method of reflection in real-time action proved best to reveal how students develop vocational knowledge. During the stimulated recall interviews (i.e., reflection on real-time action), students experienced a judgmental character which caused them to adopt a defensive attitude, which they mentioned to experience to a much lesser extent during reflection in real-time action. Hence, the underlying "good-bad" thinking principal of reflection on real-time action left little room for an open dialogue (Van Kan, et al., 2010). Based on these results, it was decided to select the method of reflection in real-time action to collect the data for the main study.

Procedure of the main study

For the main study, data were collected over a period of four months on eight separate days. All students who were present in the sandwich bar or in the restaurant's kitchen, and who were willing to participate during a day of recordings were interviewed, with a maximum of eight students per recording-day. This reflects the principle of convenience sampling (Miles & Huberman, 1994; Patton, 2002). The participating students had to sign a consent form. All recordings were transcribed verbatim and anonymised. Both a teacher, who was responsible for the training of the participating students in the sandwich bar, and a researcher (i.e., the first author) interviewed the students together. In this way, we aimed to gain as complete a picture as possible of students' cognitive processes during performance in

occupational practice. The teacher was up-to-date on the current level of students' knowledge and was therefore able to ask in-depth or follow-up questions. The researcher played the role of "naïve-other" and asked questions about students' activities, which might be all too often implicit or tacit in nature for both student and teacher (cf. knowledge encapsulation, Rikers, Schmidt & Boshuizen, 2000). Due to practical reasons, the teacher had to withdraw from the interviews after the first half of the interviews. The researcher was sufficiently trained during the overall research project and inducted into relevant applications of concepts and gained familiarity to the language of the occupation, to independently conduct the second half of the interviews.

Data analysis
Development of a coding scheme

A coding scheme was developed following a stepwise procedure (see Table 4.1). This stepwise procedure involved a combination of a deductive and an inductive approach (Miles & Huberman, 1994). In a first step, the transcripts of the interviews were divided into articulations of speakers, namely, interviewers' questions and students' articulations. Only students' articulations were analysed, and the unit of analysis was determined as students' articulations, namely, students' verbalised accounts of vocational learning practices. A student's articulation involved one or more utterances between a turn of speakers.

This study aims to gain insight into the process of contextualising, and therefore, the relevance of students' vocational knowledge was not at focus. Furthermore, an intensive form of debriefing was applied, in which the first two authors discussed conjectures and conclusions, and in cases of doubt verified with the third author until agreement was reached (Guba, 1981). The first two authors applied two rounds of coding sessions on randomly selected articulations of students from data of the pilot study. The idea of sensitising concepts was introduced to provide an analytic frame without pre-fixed concepts (Bowen, 2008). Two sensitising concepts were selected: conceptualising, defined as articulations involving conceptual-related reasons, and concretising, defined as articulations involving action-related reasons.

Using an inductive approach, the two sensitising concepts were operationalised into nine different labels (see Table 4.1). Following, another two rounds of coding were conducted and based on the results, the labels were redefined. For instance, the initial coding scheme involved levels of conceptualising and concretising. However, we did not intend to develop a ranking system, and therefore, the developed "levels" of conceptualising and concretising were deleted. Furthermore, a third label, namely, "inextricably-related", was added to the coding scheme to label students' articulations which could not be distinguished into conceptualising or concretising but illustrated articulations with both conceptual-related reasons (i.e., conceptualising), and action-related reasons (i.e., concretising).

A third round of coding was conducted on 10% of students' articulations, stemming from the data of the main study. At the end of this third round, a good level of inter-rater reliability (Cohen's Kappa) was reached (k: 0.90). With the final coding scheme, the first author analysed half of the randomly selected data (n=944 articulations). After coding half of the articulations saturation was reached, meaning no new labels were found which suggests all labels were adequately explained (Bowen, 2008).

Table 4.1
Procedure of the analysis

	DEDUCTIVE WAY (Pilot study 1: 2 rounds)	INDUCTIVE WAY (Pilot study 1: 2 rounds)	COMBINATION (FINAL) (Pilot study 2: 3 rounds)
Labels	*Conceptualising: inferring what follows from understanding what a concept means in a situation in relation to the meaning of other concepts.* *Concretising: inferring what follows from understanding an aspect of the occupational practice in which students are participating and how to use that concept.*	*Conceptualising:* *Level 1: Articulating a concept or idea and relating the concept to an action* *Level 2: Cause-effect argumentation* *Level 3: Clarifying how a concept or idea relates to other concepts or ideas* *Concretising:* *Level 1: Articulating what one is doing or what is going on and what products, materials or methods are involved* *Level 2: Articulating alternatives for acting, adapted to the situation* *Level 3: Articulating a decision and the consequent actions* *Other/ Not applicable* *Articulations not related to vocational knowledge or reasons for acting or confirmation words, repetition questions of students, et cetera.*	*Conceptualising is a movement towards understanding involving predominantly conceptual-related reasons (CR). Conceptualising is when students: mention or link concepts to actions; explain or clarify actions with concepts more generally in cause and effect reasoning.* *Concretising is a movement towards action involving predominantly action-related reasons (AR). Concretising is when students: articulate what one is doing (actions) or what is going on to interpret the situation explain or clarify concepts and their appropriate use* *Inextricable relationship:* *Articulations with both action-related reasons and conceptual-related reasons* *Other/ Not applicable* *Articulations not related to vocational knowledge or reasons for acting or confirmation words, repetition questions of students, et cetera.*
Level of analysis		*Articulations*	*Moviemaker and Excel*
Number of assessors		*3*	*3*
Research software		*Moviemaker and Excel*	*Excel*

Results: characteristics and illustrations

The results show how conceptualising was found in 15% of all articulations and con-cretising was labelled in 42% of all 944 articulations. 34% of students' articulations received the label other/not applicable. These labels involved articulations that did not relate to occupation-specific knowledge. Furthermore, articulations with this label involved confirmation words, repetition, yes- and no-answers, or questions of students. 3% of these articulations were indicated to relate to a hunch, a feeling or to something intuitive. For instance, students articulated: "I guess that is about 50 grams. I do not have to weigh the salmon, I just know it is 50 grams." or, "I just know." or "I can sense it."

In the following section, the two reasoning activities involved in contextualising are described separately in terms of labels, and portray respectively conceptualising or concretising (see Table 4.2). Additionally, the labels of conceptualising and concretising are illustrated with examples from the data of three students, named Anne, Sven, and Jasper (pseudonyms). In general, the results show how conceptu-alising is characterised by a movement towards understanding, and concretising by a movement towards action. The labels together portray how students articu-late the process of contextualising and provide insight into how students develop vocational knowledge. Furthermore, the sometimes-intimate relationship between concepts (i.e., knowledge) and action is illustrated with examples from the data.

Table 4.2
Labels of contextualising vocational knowledge

CONTEXTUALISING	LABEL 1	LABEL 2
CONCEPTUALISING	Students mention concepts or link concepts, stemming from either academic disciplines or occupationally contextualised disciplinary knowledge, to actions.	Students explain their actions in more general terms and link new concepts to the vocational activity in cause-and-effect reasoning.
CONCRETISING	Students mention what they do (actions) or what is going on to interpret the situation.	Students explain or clarify the appropriate use of concepts.
OTHER/NOT APPLICABLE	Articulations not relating to occupation-specific knowledge or reasons to act, confirmation words, repetition, yes- and no-answers, or questions of the students themselves.	

Conceptualising

Conceptualising involves articulations with a focus on more general concepts and involves a reasoning process towards understanding (see Table 4.2). Conceptualising is portrayed by two labels and involves conceptual-related reasons. The first label involves articulations in which students mention concepts or link concepts to actions. For instance, concepts stemming from either an academic discipline (i.e., mathematics, chemistry) or occupationally contextualised disciplinary knowledge (e.g., cooking processes, technical terms and tools). An example is the response of Anne to the question whether she registers all menu items: "Yes, I do. It is called menu engineering". This articulation was labelled as conceptualising because Anne links a culinary concept to an act.

Additionally, the following three examples illustrate label 1 of conceptualising:

> Interviewer: What are you doing?
> Sven: First, I cut it (a hot pepper) into strips, that is a Julienne cut. And then in dices, in a Brunoised cut.

> Interviewer: Why should you stick to the recipe?
> Anne: I should stick to the recipe because of the food allergy legislation law.

> Interviewer: Why should you cut out the fat of smoked salmon?
> Jasper: This piece of fat? Yes, well, that does not taste good. So, I cut it out to improve the flavour of the salmon.

In these examples, students mention concepts such as Julienne cut and Brunoised cut, food allergy legislation law, and flavour. Students connect these concepts to actions (e.g., the concept Julienne cut is linked to the action 'cutting into strips'). In this way, students show how they connect concepts to vocational activities. These articulations therefore suggest how students understand concepts in relation to specific actions.

The second label of conceptualising shows how students explain their actions in more general terms, using concepts stemming from academic disciplines or how students mention occupationally-contextualised disciplinary knowledge. This label illustrates how students connect new concepts to a vocational activity in cause-and-effect reasoning. In cause-and-effect reasoning, students often connect other relevant concepts within the occupation to the specific vocational activity to gain a deeper understanding of the vocational activity. In the following examples, illustrations of label 2 of conceptualising are presented: "Otherwise, yes well, otherwise it is unhygienic. Then cross-contamination might occur." This is an answer of a culinary student named Sven who responses to a question about the existence of different cutting boards for different food groups. In this answer, Sven explains a consequence of using one and the same cutting board for different ingredients, and introduces new concepts, such as unhygienic and cross-contamination.

In the next illustration, the culinary student Jasper connects several new concepts, such as shelf life and oxygen, to the vocational activity of preserving food. Jasper explains the effect of using vacuum sealer bags, and uses concepts rooted in the disciplines of chemistry and biology.

> Jasper: *I preserve smoked chicken breast in a vacuum*
> *sealer bag because it is air free!*
> Interviewer: *Air free. Why is that important?*
> Jasper: *Then, it has a longer shelf life.*
> Interviewer: *Why?*
> Jasper: *(Silence)*
> Interviewer: *What do you take out of the bag?*
> Jasper: *The air, err… oxygen!*
> Interviewer: *And with oxygen, what might survive?*
> Jasper: *Micro-organisms can survive*

Anne, a restaurant management student explains why she did not manage to open the bar at 10 am: "We had a lot of mise-en-place to do, and we put the baguettes in the oven too late. So yeah, well that's a shame because now we miss out on our daily profit." In her response, Anne illustrates how she connects a relevant, more general concept, namely, daily profit, to the vocational activity of putting everything into place (i.e., mise-en-place in cause and effect reasoning. Anne illustrates how she has a deeper understanding of the specific activity because she can position it in the context of a greater whole.

Concretising

Concretising focuses predominantly on action. It involves the reasoning activity of inferring what it means to understand an aspect of a situation, and to understand the kinds of actions that are required to perform the vocational activity. Concretising is portrayed by two labels that involve action-related reasons. The first label of concretising shows how students articulate what they do (actions) or what is going on to interpret the situation. The following examples illustrate label one of concretising:

> *"… I just sliced a shallow X and if I put it (tomato) in boiling water now, then the X will split open wider. And then I put it in here, to cool it off (the student points at a bowl of ice water). And then, I can very easily peel off the skin of the tomato."*

> *"I am cutting chicken for the spicy chicken (salad). He is preparing chili sauce, so, I am preparing the chicken".*

> *"I am using a regular onion, but it can also be shallots. And then … Yes, well, I always add 2 tablespoons of mayonnaise and then I mix it, and then I add salt and pepper and, voila, there you have your tuna salad!"*

> *"Right now, I still should make a cheese sandwich, and … let me see, not the chicken curry, they are preparing that already."*

In these illustrations, the individual students interpret the situation and articulate what they are doing or what should be done, and the choices they make. Label one of concretising is portrayed by articulations in which students articulate their actions at a very practical level. Concretising is not about explanations or articulating the purpose of actions, that is, to explain why specific things are done and certain products are used.

The second label of concretising shows how students explain what the appropriate use of concepts is or explain the practical applications of concepts:

> *"Err yeah, each cutting board has its own colour, so, yellow is for poultry, that means, for chicken. Red is for meat, white is for bread. Green is for vegetables ... and fruit."*

> *"I am slicing smoked salmon. (…) That means, cutting it in equal and thin slices. I am still not good at it, but I am doing my best."*

> *"I am going to peel the skin of tomatoes. Actually, that means taking off the skin of the tomato."*

These articulations were coded with the second label of concretising because these articulations involve action-related reasons. Students explain or clarify the practical use or applications of concepts. Although one could argue these articulations are in some way still at a conceptual level, the articulations involve explications of concepts in terms of actions and their appropriate use, and therefore received the second label of concretising.

A continuous movement

In our attempt to grasp and reveal the process of contextualising, analytic distinctions were made between conceptualising and concretising. However, the results show 9% of the 944 articulations involved both action-related reasons and conceptual-related reasons. These articulations illustrate how the process of contextualising is a continuous movement of reasoning activities between understanding and action, and vice versa (see Figure 4.1). The two examples below illustrate the continuous movement between conceptualising and concretising.

Figure 4.1
The wave of contextualising

Conceptualising

Judging a hot pepper

Firmness of the product

Freshness of product

Checking if the pepper is bad

Feeling if the pepper is soft

Checking fungus or rotten spots

Looking and smelling
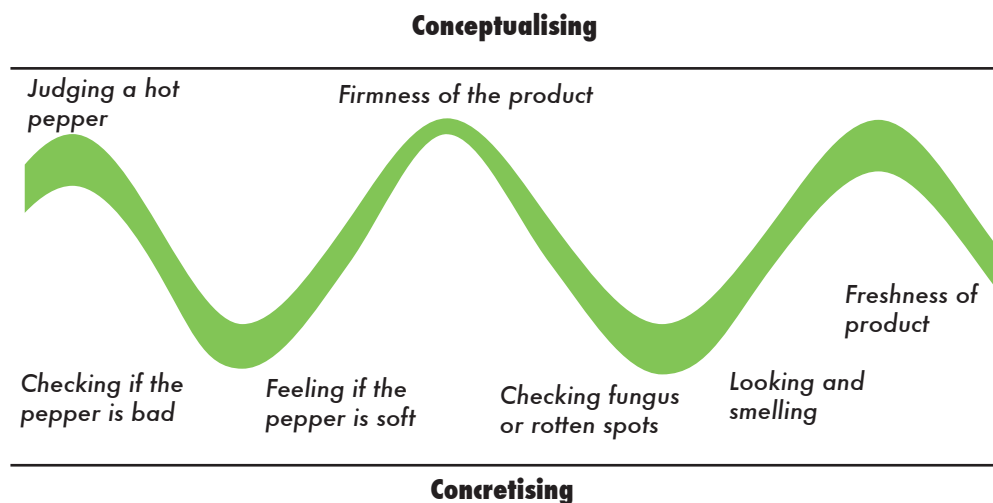
Concretising

In the following example, the culinary student Sven first articulates the activity of checking whether a hot pepper is bad or not. Sven both conceptualises and concretises, for instance, he connects the softness of the pepper to the more general concept of firmness of products. Then he concretises firmness into growth of fungus and rotten spots. Additionally, Sven mentions that he "looks and smells", and he introduces a more general concept, namely, the freshness of products. In Figure 4.1, the wave illustrates the ongoing process of contextualising, and illustrates how this student moves back and forth in his reasoning between conceptualising and concretising.

> *Interviewer:* *One last question: how can you tell, whether you can use that hot pepper? I mean, do you just grab a hot pepper and start cutting?*
>
> *Sven:* *No, I first check if the hot pepper is not bad.*
>
> *Interviewer:* *And how can you tell?*
>
> *Sven:* *Soft. Based on the firmness of the product. And I check if I don't see any growth of fungus or rotten spots.*
>
> *Interviewer:* *Right. So, you examine by touching and looking?*
>
> *Sven:* *Yes, you look and you can also smell the product. It is all about the freshness of a product.*

In the following example, the restaurant management student Anne asks her teacher for help while she is slicing smoked salmon. The episode starts when Anne's teacher has taken over the task and shows Anne how she should cut the smoked salmon.

Interviewer:	*If you use the straight cut and you end up here, then...?*
Anne:	*Then you get thinner slices.*
Interviewer	*Not only thinner…?*
Anne:	*And fatter, I think?*
Interviewer:	*If you end up here, will it be thin or thick?*
Anne:	*Thinner?*
Interviewer:	*What will happen to a salty flavour during a curing process? And the smoky flavour will be…?*
Anne:	*That will be… well, stronger?*
Interviewer:	*Stronger. Thus, I want the flavour evenly divided over the slices and that's why I cut in somewhat longer slices. Use a horizontal cut.*
Anne:	*Now I get it!*
Interviewer:	*What is curing? And what is smoky flavour?*
Anne:	*Well, curing is … I don't know if I can explain it correctly, I just had a few theoretical lessons. Err… to cure is, well, it is the same as with smoking I think. A layer of salt is put around the product. Yes, I think that is exactly curing! I learn each day…*
Interviewer:	*Of course.*
Anne:	*But yeah, well, with curing you put a layer of salt around, and err…, I don't know if this is done immediately or separately, but smoking is done above a smoker or in a smoker, so the smoky flavour can get inside the product. And the product is also being cooked.*
Interviewer:	*So, smoking is done for the cooking of products?*
Anne:	*Yes, and to add flavour. That's the same with meat. That's also possible. You should not smoke the meat, to cook it and the aim can also be adding a smoky flavour.*
Interviewer:	*How do we call these methods, curing and smoking? Pre…?*
Anne:	*Preservation of food!*

In the beginning of this episode, Anne articulates several action-related reasons. In the line of questioning, the teacher models, and adopts a think aloud technique and explains what he is doing and why. Furthermore, the teacher tries to invite Anne to do the same. Several relevant concepts are introduced such as a curing method, salty and smoky flavour, a horizontal cutting technique et cetera. And finally, Anne can connect the more general concept of food preservation with the techniques of curing and smoking.

CONCLUSIONS

In this chapter, it was explored how students develop vocational knowledge during performance in occupational practice. To contribute to a way of thinking about the complexities of vocational knowledge, an activity-inferential approach to learning in terms of contextualising was introduced. Van Oers' (1998a) sociocultural idea of contextualising was enhanced and supplemented with inferentialism (Brandom, 1994). In this approach, the activity of contextualising is perceived as a participatory process of reason-giving between students and others (e.g., fellow students, teachers, and other educators). This means, contextualising emphasises the appropriate use of concepts (i.e., an individual cognitive activity), and the inferential relations of these concepts are explained in terms of the ability to explain and justify to others the reasons for what you say or do (i.e., social participation). Through contextualising students learn to communicate in the language of the occupation-specific field of practice and act according to its norms (Bakker & Derry, 2011). Hence, students learn to "know their onions".

In general, the results show the process of contextualising covers a broad spectrum of ongoing, sometimes inextricably related reasoning activities which are defined as conceptualising and concretising. Together the activities of conceptualising and concretising allow students to recognise, use and develop vocational knowledge, and how these activities provide coherence between students' knowing and doing. The illustrations of students' articulations of contextualising in this chapter may seem like simple examples of cooking. However, in the examples students' articulations illustrate many different compositions of different kinds of reasons, which we analytically distinguished to involve predominantly action-related reasons or conceptual-related reasons.

Specifically, the results show how conceptualising involves reasoning activities in which the orientation is predominantly on understanding, while concretising involves reasoning activities with an orientation predominantly on action. Students' articulations of conceptualising indicate a focus on concepts more generally to understand a vocational activity, and students' articulations of concretising illustrate how students reason about their vocational activities, and how they explain in more practical terms, their use of concepts and how they relate concepts to vocational activities.

Challenges

The results of the presented study show how students were predominantly focused on action rather than articulating concepts stemming from either academic disciplines or relating concepts to action more generally. In previous research, results also show how students frequently do not see the point of learning disciplinary knowledge such as mathematics or chemistry, while experts acknowledge the importance in occupational practice (Bakker & Akkerman, 2014). Furthermore, in the workplace, knowledge is mostly restricted to what is applied at work, and knowledge is tied to the present and reduced to contextually specific applications of knowledge. In such settings, the focus is often on workplace tasks, roles or requirements (Wheelahan, 2015). Therefore, to

invite students to articulate the process of contextualising in a practice-based setting might have revealed the kind of knowledge which is tied to workplace situations. And therefore, possibly, not all of students' understandings of vocational knowledge were exposed.

In this study, students were invited with the interview technique of reflection in real-time action to articulate their reasoning. Together, a teacher and the first researcher carried out the interviews. We should consider whether this interview technique potentially affected the results. For instance, students might have used less specific (jargon) language when they answered the researcher than responding to the questions of the teacher. Furthermore, how students contextualised vocational knowledge did not solely depend on students' abilities to articulate the process of contextualising, it also depended on the interviewers' abilities to invite students to articulate contextualising. Hence, the strength of the interview technique was simultaneously its challenge.

Directions for future research

In the theoretical framework presented in our earlier study (see Heusdens et al., 2016), the concept of web of reasons was introduced. This concept was not further explored in the study presented in this chapter since the aim was to gain insight into students' learning process rather than characterising the vocational knowledge of individual students. However, the concept of webs of reasons may provide an opportunity for future research to expand the findings of this study. Bakker & Derry (2011) suggest inferences form webs of reasons that include a range of reasons such as the purpose and relevance of actions, techniques, procedures, et cetera. In webs, the range of reasons or elements can be distinguished as kinds of knowledge such as implicit, explicit, codified, embodied and situated (De Jong & Ferguson-Hessler, 1996), and webs of reasons may be a mean to explore the integrated vocational knowledge of individual students.

The activity-inferential approach to vocational knowledge helps to understand how students develop vocational knowledge in terms of concept formation. Therefore, the focus of this study was on the cognitive process of contextualising. Aspects such as notions of hunch, intuition, human senses, et cetera, were not considered in this study despite their role in the process of becoming autonomous practitioners (Harteis, Koch & Morgenthaler, 2008; Harteis & Billett, 2013). For instance, a culinary chef is frequently called upon the senses of taste and sight; to taste for seasoning or bake until golden brown. Further investigation into the richness of human engagements is required to fully understand how aspiring practitioners develop vocational knowledge. To explore the diversity of vocational forms of knowledge in relation to the theory of contextualising, future research could grasp all aspects involved in students' vocational knowledge.
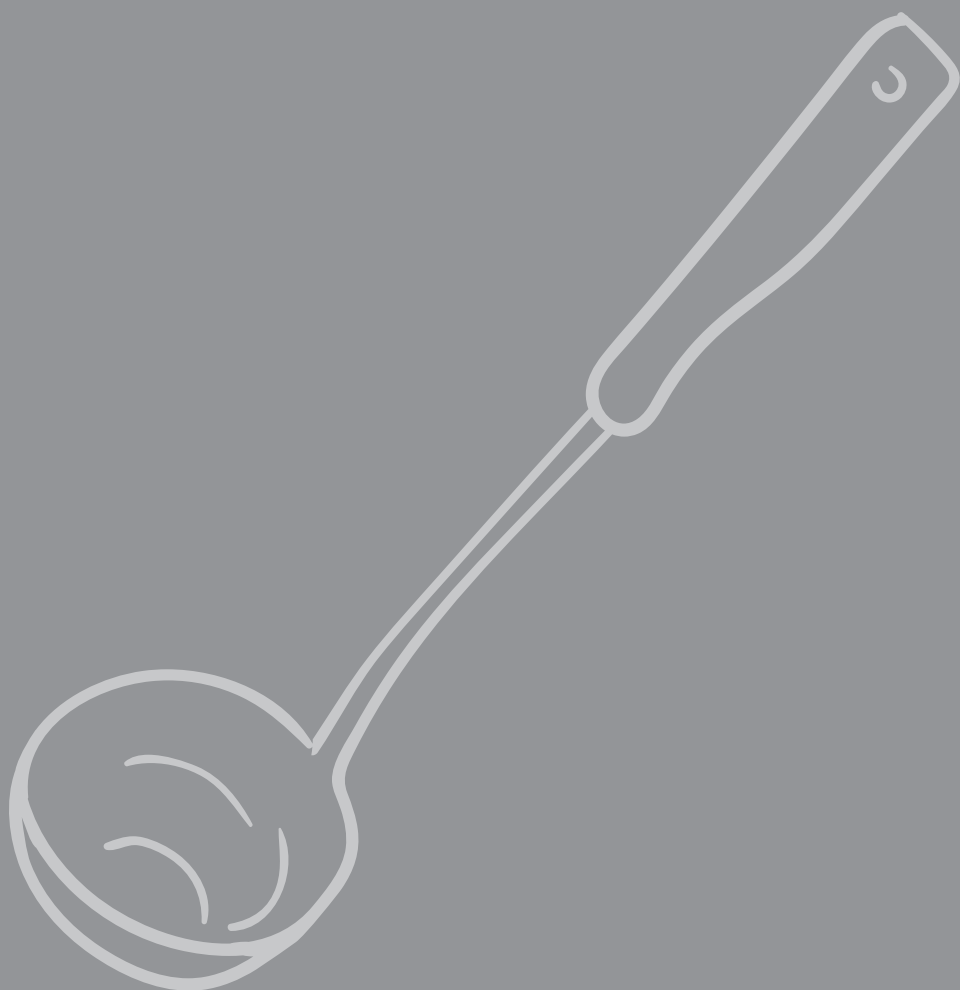
"From soup to nuts"

AN IDIOM CONVEYING THE MEANING OF 'FROM BEGINNING TO END', DERIVING FROM THE DESCRIPTION OF A FULL COURSE DINNER IN WHICH COURSES PROGRESS FROM SOUP TO A DESSERT OF NUTS (idioms.thefreedictionary.com)

CHAPTER 5

Chef's resources

ABSTRACT [6]

Students' vocational knowledge can be defined as all knowledge students require performing within occupational practice. In the context of vocational education and training, students' vocational knowledge is often discussed from a perspective of either what should be taught and learned in schools or different kinds of knowledge students should gain in occupational practice. Much less focus is on students' vocational knowledge itself. This exploratory in-depth study aims to describe what characterises students' vocational knowledge. To explore students' vocational knowledge, an analytic framework developed by Schaap and colleagues (2011) is used. This framework is used to describe vocational knowledge characteristics specifying (1) occupation-specific knowledge components, and (2) qualities. Results show the framework provides a structure to gain insight into the nature and meaning of vocational knowledge, and is valuable to describe characteristics in terms of knowledge components such as technical procedures or the social and occupational environment, and qualities such as richness, complexity and specificity. Additionally, to use an existing framework – originally developed in the contexts of ICT and Social Work - its usefulness is explored in a new context, namely, the hospitality industry. Recommendations about the framework serving as a potential tool to support students' learning processes are provided.

INTRODUCTION

The concept of vocational knowledge is a focus of growing interest to educators, policy makers and scholars in the context of vocational education and training (VET) (Bakker and Akkerman, 2014; De Bruijn and Bakker, 2017; Schaap et al., 2011; Wheelahan, 2015; Winch, 2013). Discussions about vocational knowledge in VET are often concerned with what educators intend for students to learn as laid down in curricula (Wheelahan, 2015), or with the differences between school-based learning and workplace-learning (Aprea and Sappa, 2015; Bakker and Akkerman, 2014; Tynjälä, 2013). To date, there has been less focus on students' vocational knowledge itself, specifically on what characterises the vocational knowledge of students, which they require performing within occupational practice (De Jong and Ferguson-Hessler, 1996; Eraut, 1994; Schaap et al., 2009).

In this chapter, students' vocational knowledge is perceived with a wide-ranging knowledge definition; it involves conglomerations of all kinds of knowledge required for practising an occupation (Eraut, 1994; Heusdens et al., 2016). Vocational knowledge enables students to think and act. It involves different kinds of knowledge which are based on understandings and meanings personal to them. The following episode illustrates the vocational knowledge of a culinary student named Jerry[7].

> *The chef de cuisine has just demonstrated the day's menu to his staff and he has assigned the preparation of the sauce for the main course to Jerry: A Huntsman sauce. Jerry prepared this classic homemade currant jelly sauce last week and he remembered it was also called Grand Veneur. Preparing this sauce involves a complicated process, which includes letting the sauce thicken and reduce in the oven.*
>
> *While Jerry was plating up, the orders were piling up, and Jerry noticed he did not prepare enough sauce. In all the hustle, Jerry decided to add a ready-made Grand Veneur sauce to the home-made one, because his chef expects both exemplary service and customers' orders to be served in time. Jerry was satisfied with his decision because he could serve all orders on time.*
>
> *Meanwhile, during a routine check of tasting, the chef immediately noticed the homemade sauce had a slightly different taste than usual. The chef called Jerry to account for his actions, and they jointly discussed the consequences of Jerry's decision to add ready-made sauce to the home-made one.*

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7 This episode derives from the study on students' vocational knowledge development described in chapter 4. All names of persons are pseudonyms. When the label 'student(s)' is used, this label is interchangeable with learner(s), candidate(s) or participant(s), both male and female.

To make meaning of the situation involving the preparation of the sauce, the culinary student Jerry is required to make all kinds of judgements. For instance, Jerry judges he should get started quickly because of the complicated task assigned to him. Since the orders are piling up and sauce is running low, he decides to add ready-made sauce to the homemade one. Jerry's judgements illustrate what he knows and his vocational-knowledge becomes visible. The episode further illustrates how Jerry did not consider every aspect of the situation. Perhaps, he did not know about the new allergy labelling legislation, and therefore, Jerry did not understand the practical application of the food rules and regulations around allergens. The ingredients of a ready-made sauce might conflict with the ingredients of the homemade sauce mentioned on the menu, and might provoke an allergic reaction to one of the customers with a food allergy.

This chapter presents a study that is part of a larger research project on students' vocational knowledge. In a previous study, the nature of vocational knowledge and the processes by which students develop vocational knowledge were theorised and explored in the context of Dutch VET in hospitality and culinary education (see Heusdens et al., 2016). The aim of the present study is to capture students' vocational knowledge and characterise what students know. To gain insight into students' vocational knowledge itself helps to clarify students' use of vocational knowledge during performance in occupational practice. For instance, in the abovementioned episode, insights into Jerry's use of vocational knowledge during occupational practices helps to understand how Jerry applies knowledge, and whether Jerry connects underlying knowledge or ideas to practice. Hence, insights into students' use of vocational knowledge provides information for teachers and educators about students' learning processes and how these processes can be best supported.

To characterise students' vocational knowledge, an analytic framework developed by Schaap and colleagues (2011) is used. This framework involves a structure of both occupation-specific knowledge components, to give meaning to students' vocational knowledge, and qualities, to explore features of students' vocational knowledge. The framework was developed to characterise the vocational knowledge of students in the context of contemporary VET, in the occupation-specific fields of ICT and Social Work. In this chapter, we aim to characterise students' vocational knowledge in a different context, namely, the hospitality industry. To use an existing framework in an additional occupation-specific field of practice, more meaning can be given to vocational knowledge and a body of evidence can be build up on what characterises students' vocational knowledge. Furthermore, the transferability of the framework to other occupation-specific fields of practice is explored (Cohen, Manion and Morrison, 2011; Guba, 1981).

In the next section, the conceptual framework is presented, followed by the methodology and the results of this study. In the result section, examples from the data to illustrate the occupation-specific knowledge components and qualities are presented to give meaning to students' vocational knowledge relevant for the hospitality industry. This chapter ends with a discussion of the main findings and directions for future research.

STUDENTS' VOCATIONAL KNOWLEDGE

In every occupation, students are challenged to deal with a range of different situations, and therefore, they are required to understand both the general context and the specific situation (Eraut, 2000). For instance, students should learn to do the right thing at the right time, and they are required to know how to decide what things they should do themselves, and what could possibly be left to others. Therefore, they should know about technical processes and procedures, and general rules and regulations of the industry etc. To perform in occupational practice, students require a broad range of relevant vocational knowledge related to different aspects of an occupation. However, before we can describe what characterises students' broad range of vocational knowledge, we should first understand its nature and the processes by which students develop vocational knowledge.

The nature of students' vocational knowledge

In most sociocultural perspectives on learning, students' vocational knowledge is perceived as the result of a reciprocal process in which students both integrate different kinds of knowledge and participate within communities of social practice (Billett, 2014; Bijlsma, et al., 2016; Eraut, 2003; Lave and Wenger, 1991; Schaap et al., 2009; Tynjälä, 2013). However, a rather under theorised aspect in these perspectives is the extent to which knowledge and action are related (Billett, 2014; Gamble, 2001; Guile, 2014). In a previous study, the idea to perceive the nature of vocational knowledge as a process, namely, an ongoing cognitive activity of meaning making, was introduced to address the intimate knowledge-action relationships in vocational knowledge (Heusdens et al., 2016). A cognitive activity of meaning making involves a process of making judgements and taking action. Meaning derives from seeing the relationships of parts to the whole, rather than being composed of only the parts (Bakker and Derry, 2011; Van Oers, 1998a).

To perceive the nature of students' vocational knowledge as a cognitive activity of meaning making explains what it means to make judgements (i.e., inferences) and take action (i.e., the appropriate use of concepts in a situation) in close relation to each other (Bakker & Derry, 2011; Beckett, 2008; Brandom, 1994; 2000; Chan, 2015; Gherardi 2009; Hager, 2000; McDowell, 1996; 2013). In this perspective, students' vocational knowledge illustrates a process in which students develop a growing understanding of how complex and interdisciplinary bodies of knowledge fit together, and how they learn to decide what knowledge is relevant for a purpose or a specific situation (Beckett, 2004). This means, the process is dialectically related since students' vocational knowledge develops by making judgements and taking action, while simultaneously, students' vocational knowledge enables them to make appropriate judgements or take the appropriate action.

Thinking about the nature of students' vocational knowledge as a reasoning process helps us to focus on any reason a student might give that is relevant in a situation (e.g. an upscale restaurant), whether an action (e.g. cooking), or a judgement (e.g. tasty), or even an emotion (e.g. joy). Students' vocational knowledge is reflected in the judgements they make and the reasons they might give. Therefore, to reveal students' vocational knowledge is, in a figure of speech, to take a 'snapshot' of their reasoning process.

To capture students' reasoning process at a moment in time reveals what students know, and thereby, enables us to describe what characterises their vocational knowledge.

A two-dimensional framework to characterise students' vocational knowledge

Students who are trained to become managers in up-scale restaurants make different meanings to knowledge of, for instance, a target group than culinary students who are trained for the kitchen of a hospital. To give meaning to the vocational knowledge of individual students, Schaap and colleagues (2011) developed an analytic framework to characterise vocational knowledge of individual students for any domain specific occupational field of practice. The framework involves two general dimensions to distinguish between what students' vocational knowledge is about and the quality of their vocational knowledge (see Table 5.1).

The first dimension of the framework involves occupation-specific knowledge components. This dimension covers a broad range of relevant knowledge related to different aspects of an occupation (Schaap et al., 2011). It involves six knowledge components: (1) technical processes and procedures (TPP), (2) target group (TG), (3) social environment (SE), (4) organisational structure (OS), (5) occupational environment (OE), and (6) personal development (PD) (see Table 5.1). The TPP and TG components involve relevant knowledge of operational processes and primary activities (Young and Guile, 2003; Schaap et al., 2011). The SE, OS and OE components involve knowledge about more general aspects of the occupation-specific environment (Boreham, 2004; Schaap et al., 2011; Van den Bogaart et al., 2016), and the PD component involves knowledge necessary for the personal development of a practitioner (Billett, 2011).

The second dimension involves qualities to explore students' cognitive elaborateness and the relevance of their vocational knowledge (De Jong and Ferguson-Hessler, 1996). The dimension involves four qualities, namely, concreteness, complexity, richness and specificity. Concreteness, richness, and complexity reflect the detailed nature of students' vocational knowledge and contribute to insights into students' cognitive elaborateness. The quality specificity reveals the relevance of students' vocational knowledge to their occupation-specific field of practice (Schaap et al., 2011). All qualities together indicate the extent to which students can see the relationship of parts to the whole rather than being left with a focus on isolated parts (De Jong and Ferguson-Hessler, 1996). Quality is used here as a synonym to feature in a philosophical sense, and not as a value judgement (Van den Bogaart et al., 2016). For instance, the vocational knowledge of one student might be more complex than that of another student. However, this does not necessarily mean the first student knows more or has 'better' knowledge.

The framework developed by Schaap and colleagues (2011) has been validated in the occupation-specific fields of ICT (Huijts et al., 2011), Social Work (Schaap et al., 2011), and more recently, in the context of higher education in teacher education (Van den Bogaart et al., 2016). In these studies, the vocational knowledge of individual students was characterised. In this chapter, vocational knowledge of a group of students is characterised in terms of individual articulations of vocational knowledge. Students' articulations are taken together to indicate what characterises the vocational knowledge of the entire selected group of students.

Table 5.1

A two-dimensional framework to characterise students' vocational knowledge

DIMENSION 1: OCCUPATION-SPECIFIC KNOWLEDGE COMPONENTS	
Knowledge component	**Description**
Technical Processes and Procedures (TPP)	*What and how?*
	Knowledge about specific procedures, standardised actions, and/or the use of specific tools or instruments. For instance, knowledge of procedures, standardised actions and tools/instruments.
Target Group (TG)	*Who or what for?*
	Knowledge of the target group. For instance, identifying and understanding the group of customers the organisation wants to sell its products and services.
Social Environment (SE)	*With whom?*
	Knowledge about the social structures of the organisation such as social relations and positions. For instance, social relations and positions and roles of colleagues.
Organisational Structure (OS)	*Practitioner's position in the organisation.*
	Knowledge about the structural and cultural aspects of a business organisation. For instance, duties and responsibilities or knowing where to find relevant information about the organisation.
Occupational Environment (OE)	*The position of the organisation in the industry.*
	Knowledge about the environment of the occupation-specific field of practice. For instance, new developments in the occupational environment, rules and regulations of the hospitality industry.
Personal Development (PD)	*Practitioner's development*
	Knowledge required for the development and learning of the individual practitioner.
DIMENSION 2: QUALITIES OF VOCATIONAL KNOWLEDGE	
Quality	**Description**
Richness	The degree to which students' vocational knowledge is distributed over the six knowledge components.
Concreteness	The degree to which students' vocational knowledge refer to action which are primarily based on personal experiences in practical situations.
Complexity	The degree to which students' vocational knowledge involves interconnections between concepts, concepts and action, et cetera.
Specificity	The degree to which students' vocational knowledge involves occupation-specific terminology (i.e. terms) or jargon.

METHOD

Setting and participants

This exploratory in-depth study was carried out in a practice-based setting at an institute for hospitality and culinary education (i.e., culinary entrepreneurship) in senior secondary vocational education and training in the Netherlands. The practice-based setting involved a sandwich bar at the on-campus school restaurant which was managed by a group of hospitality and restaurant management students and culinary students. In this setting, students were introduced to future work situations, and to a wide variety of aspects of their future vocation with the aim to learn specific vocational knowledge. Therefore, this real-life mini enterprise provided us a great opportunity to interview students and take a snapshot of their vocational knowledge during performance in occupational practice.

The students who participated in this study were aged between 17 and 22. The hospitality and restaurant management students (n=56) were enrolled in a four-year school-based learning route with fulltime education in their second and third year at the senior secondary vocational education level (ISCED[8], level IV). They were trained for management roles or entrepreneurship in the hospitality industry. The culinary students (n=72) were in their first and second year of training to become culinary chefs, a three-year programme with full-time education at the senior secondary vocational education level (ISCED[8], level III; De Bruijn and Bakker, 2017). They were in training to become kitchen professionals in a wide variety of work settings in the hospitality industry.

For one semester, students managed and promoted the sandwich bar. The hospitality management students rotated in different roles which ranged from general manager of the enterprise, service-manager in the sandwich bar to executive chef in the kitchen. The culinary students were supervised by the management students and were responsible for preparing, cooking and presenting the food. The composition of the group of students varied every week because each student followed a personal educational track.

Procedure

In the second semester of their school year, students were interviewed in the sandwich bar over the course of four months. The interviews were conducted every other week, during one day a week. In this way, a total of eight days of around nine hours of video-recorded interviews were collected. As many articulations, as possible were collected from all students present in the sandwich bar at the time of recording and who were willing to participate (i.e., convenience sampling) (see Miles and Huberman, 1994; Patton, 2002). Students were invited to reflect on their actions at the time of an event or interaction. They were invited to articulate their thinking aloud during performance in occupational practice. This method of 'reflection-in-real-time-action' involves a mixture of knowing and doing, described by Schön (1983) as 'theory-in-use'.

8 International Standard Classification of Education, a departmente of UNESCO

With the aim to manage and reduce the amount of data, half of the interviews were selected for data analysis. From the 8 days of recordings, recording days 1, 3, 5 and 7 were selected preventing to solely select interviews in the beginning or at the end of the timeframe (Guba, 1981; Patton, 1990). A teacher and a researcher (i.e., the first author) conducted the interviews together. This method was selected because the teacher was up-to-date on the current level of students' vocational knowledge and was therefore able to ask in-depth or follow-up questions. While the researcher played the role of 'naïve-other' and asked questions about students' activities which might be all too often implicit or tacit in nature for both student and teacher (cf. knowledge encapsulation, Rikers, Schmidt and Boshuizen, 2000). In this way, the teacher was trained to become more responsive to the implicit and tacit knowledge, and the researcher was inducted into relevant applications of concepts and gained familiarity with the language of the occupation.

Analysis

A coding scheme was developed based on the two-dimensional framework and coding scheme of Schaap and colleagues (2011). To develop a valid coding scheme, a stepwise procedure was followed (cf. Miles and Huberman, 1994). In the first step, the first and second author independently labelled in three rounds, 10% of students' articulations of vocational knowledge with the two dimensions. Exclusively students' articulations were labelled since the interviewers' prompts were not the focus of this study.

After each round adjustments were made. Conjectures and conclusions were jointly discussed by the first two authors, and in cases of doubt, verified by the third author until agreement was reached (Guba, 1981). For instance, one of the adjustments involved the exclusion of the quality concreteness. The operationalisation of the quality concreteness was not distinctive enough from the other three qualities. Therefore, in the coding scheme the dimension qualities involves only three qualities, namely, richness, complexity, and specificity. To distinguish six knowledge components, each of students' articulations of vocational knowledge received one label, namely, one of the six components or the label 'not applicable' (i.e., articulations which did not relate to one of the components or involved yes/no, repetitive or conformation answers, or a feeling or hunch/ intuition). The interrater agreement (Cohen's Kappa) was determined for the six knowledge components and showed a more than adequate level of agreement (K= .81).

To distinguish qualities in students' vocational knowledge, each articulation of students' vocational knowledge received a label for richness, complexity or specificity. Richness was defined as the degree to which students' articulations involve elements of the six knowledge components. For complexity, each articulation received one label with either (1) factual statement or (2) explanation. And for specificity, three categories were developed reflecting the number of occupation-specific jargon used per articulation. The interrater agreement for complexity showed a more than adequate level of agreement (K= .80), and for specificity an average level of agreement (K= .68).

Regarding complexity, factual statements involve basic descriptions or information statements. Explanations often address 'know-how' and 'know-why'. A sign of explanation is when students formulate if-then constructions or cause-effect relationships, or when students use examples or use cause, condition or result signal words such as, because, so that, so, then, therefore, etc. When students' articulations involve explanations, their vocational knowledge is perceived as complex since the ability to explain requires a more complex level of understanding than to merely provide factual statements (Bakker and Akkerman, 2014; Stoddart et al., 2000). The frequency and percentage of factual statements and explanations were calculated overall, and for each component.

Regarding specificity, the number of jargon used per articulation ranged from 1 to 10+. Specificity was classified into three categories. The first category involved articulations in which 1 or 2 occupational-related terms or examples were articulated. The second category involved articulations that are more specific in which students use 3-5 occupational-related terms or examples. The third category of specificity involves articulations which are the most specific, students used > 5 occupational-related terms or examples. The frequency and percentage for each category of specificity was calculated overall, and specifically, the frequency and percentage for each category for each component was calculated.

Results

A total of 1397 articulations were collected from four days of recordings. 453 articulations received a label 'not applicable' (e.g., yes and no or confirmative answers). Since our intention is to characterise what students know rather than to analyse interaction patterns, yes/no or confirmation words were not considered in the analysis of the data. A total of 944 students' articulations were labelled for the two dimensions of the framework. In the next section, first the results of the dimension 'knowledge components' are presented, and examples of students' articulations from the data are used to illustrate how the knowledge components can be interpreted for the hospitality industry. Following, the results of the dimension 'qualities' are presented and the qualities complexity and specificity are illustrated with examples from the data.

Dimension 1: occupation-specific knowledge components

Five of the six knowledge components defined by Schaap and colleagues (2011) were clearly identified. The Technical Processes and Procedures component (TPP) involves vocational knowledge students articulate related to the operational processes and primary activities of their occupation. This component involves knowledge about what should be done, how this should be done, and what instruments or tools to use. For instance, a restaurant management student is required to know how to operate the online staffing schedule. In the data examples were found such as: *'I am slicing smoked salmon, this means, slicing it in equal, thin pieces. (…)'*. This component further involves knowledge about techniques: *'Ok, I am taking the skin of it (a tomato). I just made a shallow X on the bottom and when I put it in boiling water, the skin will come off. And then I put it*

in here (points at a bowl of ice water), it cools off. Then I can easily peel off the skin'.

The Target Group component (TG) involves knowing your customers' preferences and responding to customers' needs. This component involves knowledge about all forms of interaction with a specific targeted group of customers, and knowledge in a more standardised form such as formalised procedures to deal with customers' complex problems. For instance, a restaurant management student is required to know how to handle customers' enquiries and complaints with excellent customer service because the group of customers served expects quality of service and an excellent dining experience. To illustrate, an example from the data is presented: *'(…) a lot of people put bacon on it (i.e., a sandwich)'.* Or: *'Because people, guests, do not like to wait for a long time. So, especially here, yes then… Well, people come in here, in a hurry, during their lunchbreak. They just have 5 minutes'.* Furthermore, the TG component involves knowing how to create an image of the product you want to sell the targeted group of customers. For instance, *'Oh, yes, it has a little to do with product appearance. When I look at this sandwich lying here… I would think: I am not going to eat that sandwich…! But when you see something nice, you'll be more likely to eat it. So, that has something to do with, ehm, product appearance'.*

The Social Environment component (SE) is reflected in articulations involving interactions with colleagues. For instance, a restaurant management student is waving to get his colleague's attention. This is an example of how this student might want his colleagues to interact with one another and illustrates the social relations in the restaurant. The social environment of each occupation is different and has different sets of rules. Therefore, the SE component involves knowledge of social interaction with colleagues and managers, formal and informal relations, and roles of colleagues or managers inside and/or outside a business organisation. Component SE does not include the target group (see above).

The data for the SE component showed examples such as: *'Most of the time, they (i.e., culinary students) ask or let you know, like, for instance, I have never sliced smoked salmon, how do I do that? And sometimes they say they know how to slice smoked salmon, but that's not true. They do not know how to slice smoked salmon. And, yes, well, if they have a problem, they will come to me and then we explain how they have to do it'.* Another example: *'(…) actually, that is Margaret's job because she is in charge this week, financially. Or we just walk into the kitchen and tell them to prepare more'.*

The Occupational Structure component (OS) is illustrated with articulations reflecting students' knowledge of their duties and responsibilities. In every occupation, the organisational structure will tend to differ. Therefore, the OS component involves knowledge of your rights, duties and responsibilities, and general work processes, information systems, management and cultural aspects. For instance, one of the duties of a restaurant manager is to be a role model to the staff and develop core restaurant policies and procedures. To illustrate with examples from the data: *'I am labelling products which just came out of the kitchen. This is important so we know when to throw it away. Usually, this is the kitchen staff's responsibility, but I always check whether it has been done'.* In this example, the student additionally mentions a procedure. Therefore, this articulation illustrates an overlap with another component, namely, the TPP component. However, this articulation was

labelled with the OS component because the student emphasised his responsibilities. One of the students mentioned when she was managing her staff, she played into each person's individual strengths. The interviewer asked how she knew about each person's strength, for instance, how did she know the strengths of the colleague working next to her? Her response was: *'If they look serious, that is one thing. Listen, if someone…, for instance, if someone is not very serious and more, let's say, playful, then I'd rather have them work behind the bar than in the kitchen. In the sandwich bar, he can look around, move around, a little here and there'.*

The Occupational Environment component (OE) involves new developments relevant to the occupation-specific field of practice, and about general rules and regulations. For instance, in the hospitality industry, a restaurant management student should know about the new allergy labelling legislation and the consequences of this new law for his practice. The following examples from the data illustrate this component: *'In fish, there is a bacterium that can be transferred onto meat. And that is just not right. (…) Yes, those bacteria can cross. That's why it is called cross-contamination. This means, when bacteria on one product get onto another. It might make you sick'.* Another example: *'Just the other day we had a visit of someone from food inspection and safety. He told us the sandwiches in the bar can be displayed for a maximum of two hours. Furthermore, we should label them with the time of preparation. The sandwiches in the refrigerator can stay there all day but have to be thrown away at the end of the day'.*

The Personal Development component (PD) involves the personal development and learning of a student. For instance, a restaurant management student might want to advance his career to managing his own restaurant one day. Therefore, this student must be aware what kind of management style he prefers and in what way he wants to interact with his employees to get the best results. In the data, none of students' articulations could be rightfully attributed to the PD component. Nor did any of the articulations in the category "not applicable" match the definition of the PD component as defined by Schaap and colleagues (2011) distinctively enough. Therefore, illustrations of this component are not provided.

Dimension 2: qualities of vocational knowledge

Students' articulations of vocational knowledge of the remaining five knowledge components were analysed for their richness, complexity and specificity. For richness, the results show students' articulations are distributed over five knowledge components (see Figure 5.1). Richness does not necessarily mean students are capable to interconnect different knowledge components. For instance, a student could cover three knowledge components and make strong connections between them or cover all six and interpret them as separate components.

Figure 5.1

Figure 5.1
The Quality Richness
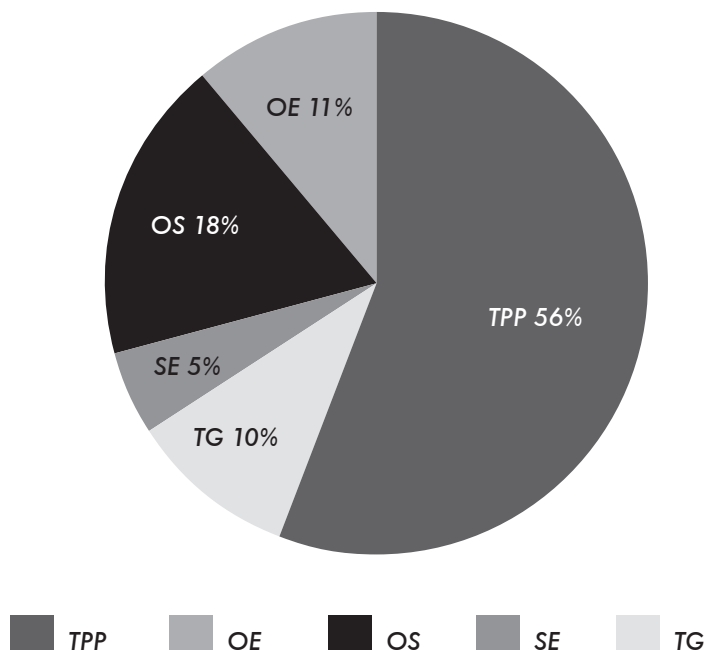
The TPP component is the most identified component (56%), followed by the OS component (18%). The OE component was identified in 11% of the articulations, and the TG component in 10%. 5% of students' articulations involve the SE component. Overall, 67% of all articulations involve knowledge required for operational processes and primary activities (i.e., the TPP and TG components), against 33% of the articulations which indicate knowledge of different aspects of the occupation-specific environment (i.e., the SE, OS and OE components).

Overall, the results for complexity show that students' articulations involve factual statements and explanations in almost equal proportions, respectively 51,4 % and 48,6%, all five knowledge components taken together (see Table 5.2). Comparing the two categories of complexity (i.e., factual statements and explanations) per knowledge component, the TG, SE, OS and OE components involve more explanations than factual statements. This means, when students talk about customers, their colleagues, duties and responsibilities, or about new rules and regulations, students tend to explain more than to make factual statements. However, when students talk about technical processes and procedures, they tend to make more factual statements about what they are doing than to explain their actions.

Table 5.2
Complexity of students' vocational knowledge

COMPLEXITY	FACTUAL STATEMENTS		EXPLANATIONS		
Knowledge components	Frequency	%	Frequency	%	Total frequency
1 TPP	331	68,2	197	42,9	528
2 TG	32	6,6	68	14,8	100
3 SE	20	4,1	24	5,2	44
4 OS	65	13,4	106	23,1	171
5 OE	37	7,6	64	13,9	101
Total	485	100	459	100	944

Specificity reflects the relevance of students' vocational knowledge and adds to complexity. It involves the number of occupation-specific terms or detailed elements students use. Occupation-specific terms for the hospitality industry involve relevant culinary terms, or elaborations and examples about cooking, the use of management jargon etc. All articulations were analysed for the number of occupation-specific terminology (terms) used, regardless of the knowledge component the articulation was classified in.

Table 5.3
The quality specificity overall

SPECIFICITY OVERALL			
		Frequency	Percent
Category	1 (1-2 terms)	529	56
	2 (3-5 terms)	339	35,9
	3 (>5 terms)	76	8,1
Total	944	100	100

Overall, the results show most articulations belong to the first category of specificity (56%) (See Table 5.3). In this category, students use 1 to 2 occupational-related terms per articulation. To illustrate this result with an example from the data, consider the following: 'I use an office knife'. The second category involves 35, 9% of the articulations, in which students use 3 to 5 occupational-related terms per articulation. 8,1% of the articulations is in the third category in which students use >5 occupational-related terms when they articulate their vocational knowledge.

The results for the three categories of specificity per knowledge component are presented in Table 5.4. The most remarkable results are presented here. The TG, OS and OE components have most of the scores in specificity category 2 (i.e., 3-5 occupation-specific terms used per articulation). The TPP component has the highest percentage of scores in the first category of specificity (67, 4%). The SE component has an equal percentage in both categories 1 and 2 of specificity. This indicates, when students talk about the social environment they equally use either 1 to 2 occupational-related terms or 3 to 5 occupational-related terms per articulation.

Table 5.4
The quality specificity per knowledge component

SPECIFICITY	CATEGORY 1	CATEGORY 2	CATEGORY 3
Knowledge component	%	%	%
1 Technical procedures	67,4	28,8	3,8
2 Target group	41	44	15
3 Social environment	42,7	42,7	14,6
4 Organisational structure	38,6	43,2	18,2
5 Occupational environment	41,6	50,5	7,9
Total	100	100	100

DISCUSSION AND RAMIFICATIONS

This chapter aimed to describe what characterises students' vocational knowledge. In an earlier study, the nature of students' vocational knowledge was conceptualised as an ongoing learning process to do justice to its complex nature and its intimate relationship to action. To capture and characterise what students know, the present study introduced and used the analytic framework developed by Schaap and colleagues (2011) and explored its usefulness to describe vocational knowledge characteristics. The significance of this study for theory is its contribution to theories of learning concerning the nature of students' vocational knowledge, and the development of a theoretical framework to characterise students' vocational knowledge in its intimate relationship to action. The practical relevance lies in the implications of the findings, which may contribute to the development of effective assessment and aligned teaching strategies to enhance students' learning in the context of VET.

Findings about knowledge components and qualities

The two-dimensional approach to characterise students' vocational knowledge in terms of occupation-specific knowledge components and qualities has proved empirically useful. The findings suggest the framework served its purpose; five knowledge components and three qualities were identified in the data. To analytically distinguish knowledge components and qualities allowed us to make meaningful distinctions in students' articulations and contributed to insights into the meaning and relevance of their vocational knowledge.

Specifically, the findings about knowledge components and qualities showed to what extent the vocational knowledge of the participating students can be characterised as rich, complex and specific. For instance, the quality richness illustrated how students' articulations were distributed over the five occupation-specific knowledge components, meaning, all knowledge components were identified in students' articulations. However, the results further showed how students' articulations were not equally distributed over the knowledge components; more than half of students' articulations were related to the technical processes and procedures component (TPP).

The results show how the participating students articulated predominantly contextually specific applications of knowledge tied to the context rather than articulating appropriate applications of knowledge from disciplinary systems of meaning. Possibly, a focus on primary activities such as knowledge of taste, ingredients and product appearance, is easier for students to picture and deal with than focusing on the broader context. Furthermore, knowledge of procedures and processes may be the kind of knowledge mostly addressed in practice-based settings, and this knowledge is applied in – more or less – similar ways in different occupational practices. Aspects such as motivating your team or understanding the implications of a new law for your own practice are harder issues to picture. Furthermore, knowledge about a target group, or the social, organisational, and occupational environment, tend to differ from one place to another. Therefore, such knowledge components involve more abstract concepts and require a higher level of conceptual understanding (Ashley, Schaap, and De Bruijn, 2017). In addition, some of the interviewers' questions about specific events or interactions might have invited students to articulate detailed explanations and be more specific rather than to articulate single statements. For these reasons, we must consider the potential influence of these aspects on the elaborateness of students' answers.

Challenges and directions for future research

In this chapter, it was argued the quality concreteness was not distinctive from the three other qualities, and therefore, not included in the data analysis. However, we suggest further exploration is necessary to explore this quality's possible value with the aim to improve the framework. Furthermore, in the data, the personal development component (PD) was difficult to distinguish and no illustrations of this component were presented. The PD component is about knowledge related to the process of becoming a practi-

tioner (see Billett, 2011), and student's ability to learn. Therefore, the development of relevant vocational knowledge involved in the knowledge components (i.e., the TPP, TG, SE, OS, OE components) is dependent on students' ability to learn and develop as a practitioner (i.e., the PD component). Possibly, the PD component was difficult to distinguish because of its different nature compared to the other five knowledge components. Further research into the PD component may be worthwhile to explore how this component can better fit its purpose and cohere with the other five components.

The results of this study did not illustrate whether the participating students knew how to differentiate between kinds of knowledge, or how students interconnected knowledge stemming from the five knowledge components, or whether the knowledge components were relevant to them. In retrospection, we question whether the rather reductionist way of analysing the qualities complexity and specificity was the most suitable way to gain insight into students' cognitive elaborateness and relevance of their vocational knowledge. Each articulation was labelled separately, therefore, the results did not illustrate how students might have interconnected concepts with other concepts, or concepts and action. Although characteristics of students' vocational knowledge specifying the three qualities were described and illustrated, further research is necessary to refine these research findings.

Another challenge can be found in the interview technique to invite students to reflect in real-time action by both a teacher and a researcher. We must consider how this interventionist strategy (Bronkhorst et al., 2011) might have invited students to use less specific jargon language when addressing the researcher than when responding to the teacher's questions. For instance, a student might have articulated his knowledge in a highly specific manner and explain things accurately to the teacher, however, this student may have used lay language out of courtesy when addressing the researcher. Furthermore, in a student-teacher relationship there is always the risk of students trying to get 'the result' the teacher is expecting (Van Kan, Ponte, and Verloop, 2010), rather than focusing on understanding the process of running a business. This means, although students' articulations can be considered as a valid form of vocational knowledge, we must consider whether the role of the interviewers as interventionists may potentially have influenced the results.

The challenge of the interview technique to invite students to reflect in real-time action was simultaneously its strength. The results showed how the participating students were quite able to explain and justify what they were doing and for what reasons sometimes even to students' own surprise. This technique challenged students to articulate their knowledge to the best of their abilities. Therefore, the results showed how the technique has proven an appropriate method to grasp and reveal students' vocational knowledge with the aim to characterise this kind of knowledge. Furthermore, to purposely invite students to reflect in real-time action has the potential of a promising teaching strategy (see, e.g., De Bruijn, 2012). Aligned teaching strategies are necessary to teach students how to access different kinds of knowledge during performance in occupational practice, and how to recognise knowledge in occupational practices. We therefore strongly suggest future research to explore this method as a pedagogic strategy.

A final challenge of the study can be found in the role of affect and intuition. The role of affect and intuition were not take into consideration in the analyses. We acknowledge intuition and notions of hunch and feeling present essential components in performance in occupational practice for many occupations (Harteis, Koch, and Morgenthaler, 2008; Harteis and Billett, 2013). Therefore, a goal for future research could be to explore the possibilities to introduce intuition as a form of knowledge and broaden the focus of the framework on the dimension of knowledge components with intuition to fully grasp and understand students' vocational knowledge.

A rather unexpected, but promising finding is the potential use of the structure of knowledge components and qualities to serve as an assessment tool for teachers (Schaap et al., 2011; Van den Bogaart et al., 2016). The two-dimensional frame might help teachers to monitor knowledge development at both an individual and group level. Monitoring the development of vocational knowledge in such ways may provide teachers with a tool to enhance students' thinking and integration processes during performance in occupational practice. To monitor knowledge development group wise, enables teachers to emphasise knowledge components during students' training programmes, adapted to their course level and occupation-specific field of practice. Hence, it may be worthwhile for future research to explore the potential of the framework as a tool for teachers and, consequently, adapt the requirements of teacher training programmes to include learning to conduct group interviews, and to use the results to map students' vocational knowledge.

Additionally, the structure of knowledge components and qualities may serve as a self-assessment tool for students to gain insight into the interconnectedness of complex and interdisciplinary bodies of knowledge and monitor their development of relevant vocational knowledge to improve their vocational knowledge. Hence, a structure of knowledge components and qualities could enable both teachers and students to gain insight into the extent to which students are capable to express themselves and their ideas in the language of the occupation-specific field of practice and act according to its norms (Bakker and Derry, 2011).

To contribute to the development of a useful instrument to characterise vocational knowledge in terms of a process, we aimed to better understand students' learning processes, and we might have provided information for a potential tool for teachers and educators to monitor students' learning processes and explore how students' vocational knowledge during performance in occupational practice can be influenced. Although this study has not revealed all aspects of students' vocational knowledge, the exploration itself yields results which other researchers can use to carry insights about students' learning even further in the future. For future research, it would be interesting to explore how the two dimensions of the framework are useful to better understand knowledge-action relationships. All things considered, this study has contributed to insights into the extent of students' vocational knowledge, and possibly, presented a potential tool to determine whether students "know everything from soup to dessert".

"The proof of the pudding
(is in the eating)"

SAID TO MEAN THAT YOU CAN ONLY JUDGE THE QUALITY OF SOMETHING AFTER YOU HAVE
TRIED, USED, OR EXPERIENCED IT (idioms.thefreedictionary.com)

CHAPTER 6

A review of tomorrow's menu

GENERAL CONCLUSION

This thesis presents a research project on understanding students' vocational knowledge in the context of Dutch senior secondary vocational education and training (mbo). Understanding students' vocational knowledge is necessary because there is still no consensus among scholars how to theorise the nature of students' vocational knowledge in less dichotomous ways of thinking such as theory versus practice, or general versus specific. Furthermore, students' vocational knowledge and how students develop this kind of knowledge in the context of VET is a rather under researched topic, and hence, not much empirical evidence to build upon is at hand. Therefore, in this thesis I argued to refocus on students' vocational knowledge and a perspective is presented which conceptualises the nature of students' vocational knowledge in an inclusive way.

In this thesis, theoretical frameworks were combined, and methods developed to theorise, explore, characterise and illustrate students' vocational knowledge during performance in occupational practice. To contribute to a better understanding of students' vocational knowledge, different aims were determined, and four studies were carried out. The following aims and research questions were answered in four studies:

> **Study 1**, described in chapter 2, aimed to select the case for this thesis in terms of powerful learning environment (PLE) characteristics and answered the questions: What types of powerful learning environments can be distinguished in the design of the learning environments of two educational programmes, namely, building and construction management and hospitality restaurant management? And what case is the most powerful learning environment?

> **Study 2**, described in chapter 3, aimed to theorise the nature of students' vocational knowledge and presented the theoretical background of the thesis. The question answered in this chapter was: How can students' vocational knowledge be conceptualised?

> **Study 3**, described in chapter 4, aimed to explore and illustrate the developed theory in practice and answered the question: How do students develop vocational knowledge during performance in occupational practice?

> **Study 4**, described in chapter 5, aimed to explore what students know and described characteristics of students' vocational knowledge. The chapter answered the question: How can students' vocational knowledge be characterised?

The conceptual and empirical studies presented in this thesis have all contributed to a more nuanced and improved understanding of students' vocational knowledge. Based on the results of the survey study (chapter 2), the stage for this thesis was selected in terms of PLE characteristics. By selecting a PLE in advance, the probability to grasp and reveal students' vocational knowledge was increased. Following Van

Oers (1998a) and Guile (2014), the nature of students' vocational knowledge was conceptualised as an ongoing process of contextualisation, which has led to a more inclusive theory of the nature of students' vocational knowledge. The presented theory of the nature of students' vocational knowledge acknowledges the some-times-intimate relationships between knowledge and action in vocational knowledge. The empirical explorations of students' vocational knowledge in this thesis improved our understanding of how students use concepts as resources to guide thinking and acting in occupational practice. Furthermore, the characterisations and illustrations of students' vocational knowledge in terms of occupation-specific knowledge components and qualities, provided insight into the meaning of students' vocational knowledge for the domain specific occupational field of practice of the hospitality industry. To describe characteristics of students' vocational knowledge helped to grasp students' understanding of, for instance, the difference between cooking well and practising the occupation of a culinary chef. The occupation of a culinary chef is much more than being capable of cooking well, it also involves knowledge about the targeted group of customers, managing kitchen staff, food rules and regulations et cetera.

In the following sections, the conceptual contribution of this thesis is discussed, and the value of the empirical findings is defined. First, in the section 'A conceptual challenge' the implications of the conceptual framework are presented, and the key findings are positioned within contemporary research and debates on the issue of students' learning processes in the context of VET. In this section, I explain how my work might contribute to resolving an existing tension in the literature which Sfard (1998) identified as the acquisition and participation dimensions of learning. To position the conceptual framework of this thesis (as presented in chapter 3) within contemporary research and educational debates helps to better understand its contribution to theories of learning. Furthermore, the activity-inferential perspective taken on students' vocational knowledge in this thesis adds to contemporary knowledge and debates in several ways both theoretically and for practice.

The section 'A methodological challenge' describes a reflection on the methodological explorations which took place to develop methods for the empirical studies. Various methods to grasp and reveal cognitive processes of individual minds were explored and piloted to select the methods for the empirical studies in this thesis. I discuss the lessons learned from this exploration of methods and present implications for further research in this area.

In the section 'Challenges for teachers and educators', implications for the design of vocational curricula are discussed based on the key findings of both the survey study, the presented theory and the empirical studies (respectively chapters 2, 3, 4 and 5). Furthermore, a focus on vocational knowledge from a learners' point of view has implications for teaching and teachers' strategies. Implications for teachers and educators are discussed, and suggestions for a potential tool for assessment of students' vocational knowledge are specified. The thesis finalises with the section 'Concluding remarks' in which potential consequences for educational theory and practices are discussed, including directions for further research.

A CONCEPTUAL CHALLENGE

The conceptual challenge of this thesis can be found in its contribution to the discussion on the nature of vocational knowledge. To theorise the nature of students' vocational knowledge in less dichotomous ways, this thesis presents a more unified way of thinking about the nature of students' vocational knowledge. Different conceptual theories were brought together to present an inclusive view of the nature of students' vocational knowledge. The conceptual frame of the thesis was developed by elaborating on existing theories of contextualising grounded in sociocultural theory (Van Oers, 1998a; 1998b), supplemented with inferentialism, a philosophical theory of meaning (Brandom, 2000; Bakker & Derry, 2011).

To engage with inferentialism in the context of education and learning not only reflects an emerging trend (see Bakker, Ben-Zvi & Makar, 2017; Bakker & Derry, 2011; Derry, 2013; Guile, 2006; Hager & Halliday, 2007; Marabini & Moretti, 2017; McCrory, 2017; Noorloos, Taylor, Bakker & Derry, 2017; Schacht & Hußmann, 2015; Schindler, Hußmann, Nilsson, & Bakker, 2017), it also has the potential to contribute to resolving an existing tension in the literature, namely, the acquisition and participation dimensions in learning (Sfard, 1998). Although inferentialism is not a learning theory, nor a psychological theory (Bakker & Hußmann, 2017; Brandom, 1994; 2000), to engage with inferentialism as input for the conceptual framework in this thesis, and specifically, its focus on the use of concepts, has been an interesting resource with which the nature of students' vocational knowledge was approached. Furthermore, to engage with inferentialism as developed by the philosopher Brandom (1994; 2000) suggests perceiving inferentialism as pragmatist, expressivist, and rationalist. This means, what people think or express is based on what they implicitly know how to do. In this view, reason is not restricted to the explicit type of inference, it is also the implicit and tacit type of inference that is not immediately expressed or explicit in language (Bakker & Hußmann, 2017). In this way, as Bakker and Hußmann (2017) argue, the key idea of inferentialism relevant to educational research is that the meaning of concepts is understood in terms of their role in reasoning practices.

In the following section, I explore whether the theory of contextualising has the potential to go beyond common dichotomous ways of thinking, and might be a way of thinking that integrates the individual constructive activity (i.e., acquisition) and social aspects of learning (i.e., participation). Therefore, the acquisition and participation dimensions in learning are first introduced to explain why different metaphors of learning focus on different aspects of learning processes, and lead to different theories of learning, and hence, to different conceptions of what a theory of learning should explain. The theory of contextualising is positioned into the context of the acquisition and participation metaphor, and I explain how contextualising can be perceived as a socio-cognitive activity of meaning making, and therefore, might integrate the individual constructive activity and the social aspect of learning.

Two perspectives of one thing: learning

Sfard identified how "… educational research is caught between two metaphors..." (1998, p.5), namely, the acquisition and participation dimensions of learning. Sfard suggested in cognitive theories of learning such as constructivism — one of the most dominant perspectives in education which covers a wide range of theories — the approach to learning is often on either the individual constructive activity or the social aspect of learning. This means, on one extreme, a perspective of cognitive constructivism can be identified in which knowledge development is primarily viewed as a cognitive activity "in" or by the individual (Taylor, Noorloos & Bakker, 2017). On the other extreme, sociocultural traditions can be identified in which educational theorists, inspired by Vygotsky (1978), perceive knowledge as situated within an occupation-specific field of practice. In this perspective, all forms of knowledge emerge from participating in social practices (Billett, 1996; Lave & Wenger, 1991; Van den Bogaart et al., 2016).

In general, cognitive constructivist perspectives tend to overemphasise the role of the individual at the cost of their social context (Akkerman, Van den Bossche, Admiraal, Gijselaers, Segers, Simons, & Kirschner, 2007), whereas in sociocultural traditions the cognitive activity of the individual receives less attention (Bijlsma et al., 2016). To distinguish a tension between an acquisition and participation metaphor reflects a tension between perspectives taken on learning. Accordingly, Akkerman and colleagues (2007) suggest the distinction between these two metaphors implies to understand learning is about where learning takes place, namely, within the individual or within the social. The aim of this thesis is to grasp students' cognitive processes to understand students' vocational knowledge. This may suggest the acquisition metaphor is privileged because to grasp students' cognitive processes is about understanding learning within the individual. However, our engagement with inferentialism provided a basis upon which learning can be perceived as both an individual constructive activity and a social activity at the same time.

To explain how cognitive activity and social participation can be unified and mutually constitutive (Taylor et al., 2017), I would like to reconsider the episode of the culinary student Vince introduced in chapter 3. In the episode, the student Vince makes the inference that the effect of sugar in strawberry jam-making acts as a means of preservation because sugar withdraws water from fruit and dehydrates them. The teacher judges Vince's inference as correct, reflecting the norms of the occupational community. In an activity-inferential perspective on learning, the focus on individual construction of knowledge as presented in a constructivist theory of learning (Bijlsma, et al., 2016; Jarodzka, Boshuizen, & Kirschner, 2012; Van Merriënboer & Sweller, 2005), is replaced by a focus on individual reasoning in learning. This means, individual reasoning in terms of concept formation can be explained as the inferences individuals make like Vince the student (i.e., exemplifying the individual cognitive aspect of learning), and the ability to explain and justify to others the reasons for what he says or does (i.e., exemplifying the social participation aspect of learning).

In an inferentialist perspective, Brandom (1994) suggests the ability to explain and justify to others the reasons for what you say or do is perceived as "the game of giving and asking for reasons" (Noorloos et al., 2017). To engage in this game involves the participatory interaction between at least two speakers. In the episode of the culinary student this is

exemplified in Vince, his teacher, and his fellow students who represent the speakers in the game. In participating in the game, students make inferences, give reasons, and use concepts according to the norms that exist in the game. Every time one speaker makes a claim, it is up to the others to assess whether the claim is justified. Hence, the game of giving and asking for reasons represents activity in social practice, and therefore, for inferentialism, reasoning is always a social process (Noorloos et al., 2017; Taylor et al., 2017).

With my attempt to explain how the theory of contextualising fully integrates individual's cognitive activity and social participation, I aimed to explain how the use of multiple combinations of metaphors enables a greater coverage of learning practices. Therefore, the contribution of this thesis to the literature on theories of learning can be found in its contribution to theorise the nature of vocational knowledge, and to perceive contextualising as a socio-cognitive activity of meaning making in terms of human reasoning: a participatory activity of learning. To supplement inferentialism to the idea of contextualising helps to understand students' vocational knowledge as a meaning making activity, and helps to understand what creates coherence between different concepts, and between concepts and actions. Furthermore, in the approach of contextualising as a participatory activity of meaning-given, the participatory part of the activity can be found in its definition, namely, an activity of individual reasoning and the ability to explain and justify to others the reasons for what you say or do.

The idea to perceive students' vocational knowledge as a meaning making activity of contextualising may be relevant to define the vocational knowledge of every practitioner. For instance, during this PhD-project, I discovered that I was constantly challenged as an aspiring researcher to contextualise knowledge. For instance, I was challenged to understand and explain concepts such as contextualising, conceptualising, concretising, and inferentialism. Furthermore, I was challenged to understand the inferential relations between these concepts, to explain what the theory of contextualising means for educational practice in relation to the meaning of innovative VET, in relation to PLEs and aligned teaching strategies. Therefore, in the process of writing a coherent thesis, I was constantly challenged to conceptualise and concretise knowledge, and to participate in the game of giving and asking for reasons. The participatory part of this game can be found in the claims in this thesis being judged by others as justified (or not…). Hence, to position the idea of students' vocational knowledge as a meaning making activity of contextualising into a broader perspective means the theory applies to every practitioner, whether aspiring or expert practitioners.

A METHODOLOGICAL CHALLENGE

Chapters 4 and 5 described the empirical explorations of students' vocational knowledge. To gain insight into how students develop vocational knowledge and to describe characteristics of their vocational knowledge, in these chapters the method of reflection in real-time action (Schön, 1983) was selected to grasp students' cognitive processes and to reveal their thinking activities. In the individual chapters of this thesis, the exploration of several methods to develop and ground methods for the empirical studies was not elab-

orately described. A prior exploration was carried out to find the most suitable method or methods to come as close as possible to students' thinking activities during performance in occupational practice to reveal their cognitive processes. In this section, this exploration of different methods is described, and recommendations for future research are presented which are based on the lessons learned from the exploration of methodologies. In previous research, methods such as stimulated recall (Meijer, Zanting & Verloop 2004; Van Kan, Ponte & Verloop, 2010) and think aloud techniques (Koopman, Teune, & Beijaard, 2012) proved to be worthwhile methods to invite participants to articulate their thinking. These types of techniques were explored in prior explorations of methods, and in the pilot study described in chapter 4. The goal of the prior explorations of methods was to come as close as possible to students' cognitive processes and therefore, to reveal their thinking activities to gain insight into their vocational knowledge. During this exploratory phase, the idea emerged that the researcher should, in a figure of speech, 'sit on students' shoulder' with a video device to capture students' vocational practices and activities during performance in occupational practice. A first trial involved a small camera device that was clipped onto students' clothing. In this way, it was aimed to capture students' vocational practices during their work in the on-campus school restaurant. This technique seemed promising, however, the camera device captured everything 'through the eyes of the student', and therefore, customers' privacy was at stake. Furthermore, due to technological limitations and because of the context, namely, a restaurant, students' voices were hardly audible. Therefore, the device did not deliver what was aimed for and a second pilot with a different method was carried out.

The second pilot involved a think-aloud technique; a common technique used to evoke thinking activities (Koopman et al., 2012). The second pilot was carried out in the courses of two Dutch educational institutes for hospitality and restaurant management which were selected in the survey study (chapter 2). At one institute, in a classroom setting students were assigned to prepare a food event as part of a public food festival in town. At another institute, students were assigned to write a business plan during a theoretical course. At both institutes, the researcher invited students to think aloud during their assignments and these sessions were audio-taped. In both cases, students often forgot to think aloud, and they were visibly irritated when the researcher reminded them to think aloud. Furthermore, several students mentioned they felt embarrassed to think aloud in front of their fellow students, while other students mentioned it felt 'artificial' to think aloud while they were individually preparing a business plan. After several sessions, the disadvantages of this technique outweighed its advantages, and it was decided another technique should be explored to come as close as possible to students' thinking activities.

A third pilot involved two stimulated recall interview techniques, namely, reflection on action using video-recordings and auto-photography (Fox-Turnbull, 2011). These methods were selected because research has shown such methods allow to investigate cognitive processes through inviting participants to recall their concurrent thinking during an event when prompted by a video sequence or photographs (Fox-Turnbull, 2011; Van Kan et al., 2010). The main aim of such methods is to collect cues to prompt participants in interviews to articulate their concurrent thinking. In the method of auto-photography, participants take and select their own photographs that are used as prompts in semi-structured interviews.

In one of the educational institutes, the researcher video-taped students during their work in a cafeteria at an office for self-employed persons. The cafeteria was part of the institute and designed as a training centre for students. In the morning, students prepared dishes for lunchtime and they had to take inventory while the researcher recorded the event. After lunchtime, students were interviewed using the video-recordings as cues. This technique seemed worthwhile; students articulated their thinking and the video-recordings seemed to help students to recall their concurrent thinking. However, during the recording-events the researcher spontaneously asked the students questions, for instance, about what they were doing or what was going on. Hence, the researcher invited students to reflect in real-time action (Schön, 1983). This method of reflecting in real-time action seemed an even more efficient way to invite students to articulate their thinking because students explained more, and, at the same time, they modelled what they were doing. To model what they were doing seemed to support students to articulate their reasoning in more detail.

In the second educational institute, for three weeks, students were asked to take photographs with their smartphones of meaningful moments during schooldays and to upload these photographs to a closed Facebook-website. Meaningful moments were defined as oops- and aha-moments (Heusdens, Baartman, & De Bruijn, 2014). An oops- or aha-moment is, respectively, a moment of confusion or incapacity to act (not knowing what to do), and a moment of sudden realisation, inspiration, insight, recognition, or comprehension. These moments aim to support students to indicate meaningful moments and to take photographs. In this way, qualitative data was captured in real-time action without the researcher being present. It was aimed to use the photographs as cues in stimulated recall interviews (Fox-Turnbull, 2011). However, after a trial of a few months with four students the technique did not have the desired outcome; students took photos of events related to general study skills or they simply forgot to take photographs, even after being prompted by text messages. After analysing the advantages and disadvantages of the methods, the technique of reflection in real-time action and the method of reflection on real-time action with video-recordings were selected for the empirical explorations of students' vocational knowledge. Furthermore, as described in chapter 4, the underlying 'good-bad' thinking principal in the method of reflection on real-time action surfaced during the pilot study and left little room for open dialogue. Hence, the method of reflection in real-time action was exclusively selected for the empirical studies in this thesis.

Lessons learned

A first lesson that can be learned from the intensive form of interviewing in real-time action, is the role of the interviewer as interventionist (Bronkhorst, Meijer, Koster & Vermunt, 2011). In the empirical studies, the interviewers in the role of expert (teacher) and naïve other (researcher), intervened with the results in different ways. For instance, as described in chapter 5, in a student-teacher relationship there is always the risk of students trying to get 'the result' the teacher is expecting rather than being focused on understanding the process of running a business. Furthermore, in his turn the teacher was challenged in the extent to which he was capable to adopt a

different role, namely that of an interviewer. While the researcher was challenged to understand the language and knowledge of the occupation-specific field of practice. And finally, students might have used less specific (jargon) language when answering the researcher, which potentially affected the results. Hence, to implement a method of reflection in real-time action, the lesson learned is to be aware of the complex and multifaceted role of the interviewer(s), which potentially influences the results.

Another lesson learned from the prior explorations of methods is to be aware of the labour intensiveness of the techniques and procedures and that some of the techniques are time-consuming. Fortunately, research has shown less intensive and time-consuming ways that have been developed to come as close as possible to students' thinking activities. For instance, Motta, Boldrini, and Cattaneo (2013) and Cattaneo, Motta and Gurtner (2015) explored the potential of light portable ICT devices such as headband cameras and mobile phones to help students capture meaningful experiences in the workplace and to store them in an electronic portfolio. In another study, Garcia, Welford and Smith (2015) discuss the advantages and disadvantages of using smartphone applications (apps) in qualitative research. They designed a participant-focused audio-visual methodology to capture qualitative data in real-time.

The advantage of using light portable ICT devices such as smartphone apps in qualitative research in VET, or in educational research in general, is that 99% of students own smartphones and use it as their primary spare-time activity (Cattaneo et al., 2015). Students can decide and be spontaneous with what they record, which is a great potential for qualitative research into peoples' lives. Students have almost permanent access to their device, and therefore, can report multiple times a day. However, the disadvantage of such methods are technological limitations, and, as the above-mentioned prior exploration of methodologies illustrated, it is important to realise it takes time before students feel responsible or take ownership to collect data such as photographs. At the time of the prior explorations of methodologies, I did not have the means to implement an automatic bleep method to prompt student to take photographs. However, a bleep method where users are sent a prompt to respond to (see Garcia et al., 2015) might have been beneficial in the method of auto-photography used in the prior exploration of methodologies.

Another potential method to explore and assess students' vocational knowledge can be found in recent work of Van den Bogaart and colleagues (2016). In their work, a computer supported procedure was developed to reveal and assess students' vocational knowledge in terms of their Personal Professional Theories (PPT). Schaap and colleagues (2009) introduced the concept of PPT and argued that during training and practice, students construct and internalize their own personal, profession-specific body of knowledge which is shaped through interaction with shared insights of practitioners in a community, namely, a Collective Professional Theories (CPT) (Van den Bogaart et al., 2016). At the basis of this computer supported procedure also lies a theory that integrates social aspects with cognitive processes of individuals, and therefore, might be an additional tool to explore students' vocational knowledge. All things considered, the abovementioned studies about ICT-devices and computer supported procedures all present interesting results. Therefore, I encourage future

research to build on and advance these still rather under-researched, but potentially valuable, tools to promote students' learning processes in the context of VET.

CHALLENGES FOR TEACHERS AND EDUCATORS

The idea of contextualising applies to both knowing how to do particular things, and to knowledge of particular theories or concepts, which not only involves knowledge about, for instance, cross contamination or food safety and hygiene, but also their inferential relationships with each other. However, the results of the empirical study described in chapter 4 indicates how students do not spontaneously contextualise vocational knowledge. Although students may well have knowledge of theories or concepts, this does not necessarily mean students know how to do particular things. Or vice versa, when students know how to do particular things, they do not necessarily have access to relevant theories or concepts (Winch, 2013). Such results have several implications for the design of vocational curricula. One implication is illustrated in the following episode that derives from an interview of the study described in chapter 4.

A culinary student Maggie is preparing sandwiches with different kinds of ingredients such as salmon, cheese, lettuce, tomatoes, egg, meat et cetera. While she is slicing tomatoes, she explains the interviewer the meaning of the concepts cross contamination and coloured coded chopping boards. At the same time, the interviewer notices Maggie is preparing the ingredients on one single chopping board, namely, a white coloured one. When Maggie is asked why she is using one single chopping board for all ingredients, her response is: "Yeah, well, this is a much faster way to work". In the episode, the culinary student Maggie gives the impression she has knowledge of concepts such as coloured coded chopping boards. However, using different kinds of chopping boards for different food groups might not have been significant to Maggie, or she considered the risk of cross contamination in this case to be small, or we might conclude Maggie did not develop the ability to make and understand inferences. For instance, Maggie might not have understood the consequences of her actions, namely, using a single chopping board for different food groups could cause an outbreak of food poisoning. Hence, we might conclude Maggie did not display to have the practical mastery in her use of the concept or related concepts (Bakker & Derry, 2011; Taylor et al., 2017).

A conclusion which can be drawn from the above-mentioned episode is that vocational students should be provided with more than access to either knowing how to do particular things, or knowledge of particular theories or concepts. Students should be provided with opportunities to learn the inferential relations between actions, between concepts, and between concepts and actions to cohere what they know and how to act. An implication from the results of the study described in chapter 4 is that in the design of vocational curricula, attention should be paid to the support of students' process of contextualising. A focus on teachers, and hence, on the guidance dimension in the design of learning environments (see chapter 2 on Powerful learning environments), that is, how to support the activity of contextualising is pivotal during learning in the context of VET. To support and invite students to contextualise vocational knowledge helps them to learn to give rea-

sons, make inferences, and choose and appropriately apply concepts (Taylor et al., 2017). Access to different kinds of knowledge provides students with opportunities to go beyond their individual experiences since experience is not determined "just by what is there, but what we have already learnt" (Collier, 1994, p. 72). Experience is not in itself self-authenticating and self-explanatory. Therefore, Wheelahan and Moodie (2011) suggest students should learn to anchor their experiences into wider systems of meaning, which, in turn, reflects an activity of contextualising. In this way, students learn to go beyond their individual experiences and to locate themselves and their experiences into a broader context.

In contemporary models of Dutch VET-curricula, learning is often organised in fragmented ways divided over a variety of subjects, courses and work experiences (Zitter & Hoeve, 2012). As argued before, to organise learning in such a way suggests a dichotomous way of thinking about learning; in school students engage in conceptual or theoretical knowledge and are introduced to the disciplinary systems of meaning (Wheelahan, 2007). In the workplace, students are introduced to knowledge that is tied to the present and reduced to contextually specific applications of knowledge. A focus on contextualising as a pivotal activity in learning in VET challenges teachers and educators to organise learning environments in such a way that students are inducted into relevant applications of knowledge through activities with others, within a particular practice. Furthermore, it has implications for how teachers should support and guide students to gain access to relevant vocational knowledge (De Bruijn, 2012), or how students' learning may be assessed, evaluated or valued (Baartman & Gulikers, 2014).

To organise learning environments in which all students are likely to contextualise, the implementations of divers teaching strategies are necessary. To support each student to undertake learning activities which are likely to achieve those understandings we want from students, adaptive teaching is necessary to respond to the mixed population of students in VET (see De Bruijn, 2006; 2012; Glaudé, Van den Berg, Verbeek & De Bruijn, 2011; Roll, Holmes, Day & Bonn, 2012; Van de Pol, Volman, Oort & Beishuizen, 2014; Young, 2011). This may be achieved when all curriculum components such as the objectives for learning, teaching strategies, learning sites, assignments and assessment tasks are aligned.

Promising findings

An unexpected, but promising finding in this PhD-research project is the immediate effects on teachers' practices. Although teachers' practices were not at focus in this thesis, the participating teacher, and teachers who were present during the data collection for the explorations of methods and for the empirical studies, all mentioned their practices changed during the research project. For instance, the participating teacher in the role of interviewer mentioned the method of reflecting in real-time action influenced his view on the role of guidance in the sandwich bar project. He explained how he became more aware of his teacher's role and how he is required to distinguish between different strategies such as modelling, coaching, guiding, monitoring, scaffolding (De Bruijn, 2012). Furthermore, this teacher explained how he became more aware of the opportunities to recognise different kinds of vocational knowledge in occupational practice, and meaningful moments to support students to reflect in real-time action.

Hence, this teacher became aware of how to support to support students to contextualise vocational knowledge and became aware of his role as a kind of meta-reflective practitioner.

Several teachers who were present during the interviews mentioned how they observed the way the interviewer(s) invited students to contextualise. The teachers mentioned they realised how often they tend to take over tasks or correct students' mistakes instead of identifying such moments as meaningful learning moments, and to perceive these moments as opportunities to support students to learn how to perform tasks and to invite students to reason what they are doing, how and for what purpose. Furthermore, they noticed how well students responded to the questions and how they seemed to become more involved in their work. Some students even mentioned they experienced to have learned a lot from "reasoning aloud" and reflecting in real-time action. They noticed they recognised knowledge in practice from classroom lessons.

In the immediate effects on teachers' practices lies a promising finding; the effects exemplify the idea of contextualising as a participatory game of giving and asking for reasons (nevertheless, in a learning environment that promotes students to contextualise, both teachers, other experts and fellow students participate in the game). For future research, it might be interesting to build on the insights from research on teaching strategies in relation to the concept of contextualising, to gain a better understanding how to design and implement the guidance dimension in PLEs.

A recommendation in terms of a potential tool for teachers and students can be found in the analytic framework presented in chapter 5. The two-dimensional framework based on the analytic framework developed by Schaap and colleagues (2011), has the potential to become a tool for teachers and educators to monitor and assess students' vocational knowledge. For students, such a tool might help them to monitor and assess their own learning (see also Van den Bogaart et al., 2016). Furthermore, the two-dimensional framework might help educators in the design of vocational curricula, to distinguish between the kinds of knowledge students should come across. The structure of occupation-specific knowledge components and qualities allows us to frame any reason students might articulate, and it helps to explore students' cognitive elaborateness and defines the relevance of students' vocational knowledge. However, future research is required to validate the relevance of such a model as a monitoring tool for both teachers, educators and students. And additionally, further research is necessary to explore the potential of the two dimensions in the framework to better understand vocational knowledge in its intimate relationship to action.

CONCLUDING REMARKS

In this thesis, the focus was typically placed on one domain of occupational practice, namely, the hospitality industry. An obvious future research suggestion is to propose to examine students' vocational knowledge in a different occupational field of practice. In this

way, the theory can be validated, its generalisability explored, and its application in other occupation-specific fields of practice investigated. Furthermore, reflecting on the activity-inferential theory to perceive the nature of students' vocational knowledge in terms of concept formation has potential consequences. Some central aspects of vocational knowledge were not involved in the perspective taken on students' vocational knowledge and require further thought. The role of affect and intuition, and the concept of web of reasons are discussed.

First, the aspects of affect and intuition are considered. In addition to the meaning-making of concepts, components such as notions of hunch, intuition, feeling, and human senses, play an important role in becoming a member of a community. For instance, a chef preparing delicious food, simply comes down to pleasing the senses by creating dishes that smell, taste and look stunning. Furthermore, most of the decisions in working-life are made under the constraints of time or restricted information. Spontaneous impulses allow quick reactions to challenging situations when there are no requirements to balance alternatives. It is reasonable to argue expert performance involves the capability to act or decide appropriately without deliberate or conscious thought, and, possibly, without awareness (i.e., intuition) (Harteis & Billett, 2013). Hence, notions of hunch, feeling, and intuition present essential components of expert performance for many occupations (Harteis, Koch & Morgenthaler, 2008; Harteis, Morgenthaler & Kugler, 2012).

Although the role of affect and intuition were not explicitly considered in the conceptual framework of this thesis, there is potential in the activity-inferential theory to broaden the focus to affective issues such as emotion, identity, and to intuition as a form of knowledge. Furthermore, unanticipated findings provided some indications of the role of intuition (chapter 4). For instance, students' articulations such as "I gotta feeling the amount was right" or "I just know, it is 50 grams. I am sure!" could be interpreted as involving affect-issues such as having a hunch or a sense of knowing what to do, without being able to further justify or explain these statements. Based on these findings, recommendations for future research are to include a focus on the richness of human engagements and to take the diversity of vocational forms of knowledge into account. Future research is necessary to add new constructs in terms of affect issues and intuition to the conceptual framework, and explore whether affect and intuition should be objectified into cognitive processes to count as knowledge (see Bourdieu, 1990, Harteis & Billett, 2013).

The third aspect relevant for vocational knowledge is the concept of web of reasons. This concept was introduced in the conceptual framework of this thesis. Webs of reasons picture contextualising as the act of gaining familiarity with wider sets of inferences that are part of the vocational domain. They are set by the activity of participants in the game of giving and asking for reasons. Therefore, students do not possess concepts, learning involves the ability to use concepts and to reason with them. In this way, webs of reasons can be perceived as an inferential metaphor to describe the activity of the student (i.e., learner), namely, a student is required to learn to reason with a web of multiple relevant reasons (Bakker, Kent, Derry, Noss, & Hoyles, 2008; Bakker et al., 2017). Furthermore, it provides a concept to map students' reasoning processes. For instance, the episode of the culinary student Boyan introduced in chapter 1, illustrates how this student is required to reasons with a web of multiple relevant reasons. Boyan had to deal with salmon that had gone bad, and therefore, he had to weight all kinds of reasons to adjust the daily special, in which the situation is likely to determine what reason outweighs other reasons (e.g., time, money, stock, type of restaurant, consequences, et cetera).

Part of the conceptual framework was still under construction during the time of the data collection. Therefore, the concept of webs of reasons was not fully conceptualised yet and not introduced as focus of study in the studies described in chapter 4 and 5. Furthermore, to enhance our understanding of students' vocational knowledge, the aim in the thesis was to gain insight into the nature of students' vocational knowledge, how students develop vocational knowledge, and what characterises their vocational knowledge. Rather than focusing on webs of individual students, the process of contextualising of the participating group of students was analysed. Therefore, the vocational knowledge of the group of students was taken together. Hence, the unit of analysis in the empirical studies was determined by all articulations of the participating students taken together.

Although the concept of web of reasons was not explicitly explored in the empirical studies in this thesis, this concept might be an interesting focus of study in educational research. For instance, in recent work of Noorloos and colleagues (2017), and Taylor and colleagues (2017), an elaboration on the concept of web of reasons can be found in which reasoning is explained in terms of mastery. Mastering is perceived as responding to norms and inferences within web of reasons, and learning is conceptualised in terms of the mastering of webs of reasons. In this view, contextualising can be positioned as the activity students engage in to master the webs of reasons. Recent research of Bakker and colleagues (2017) shows how the concept of webs of reasons can be used as a procedure to identify reasons and actions of individual students. In their study of an intern's project, for every relevant action the intern's reasons were explored with the aim to provide an overview of how actions and reasons (i.e., practice and theory) are interconnected and integrated into vocational knowledge. For further research, it may be interesting to focus on how the activity of contextualising is connected to the reasons and actions in webs of individual students. In this way, a better understanding of how students establish coherence between what they know and how to act can be demonstrated.

To conclude, this thesis has contributed to an understanding of students' vocational knowledge in both theory and practice. The theoretical framework of contextualising and the empirical explorations and illustrations of students' vocational knowledge have contributed to the scholarly literature and practice on understanding the nature of vocational knowledge, how students develop vocational knowledge and what characterises their vocational knowledge. I encourage more systematic (large-scale) research across contexts on students' vocational knowledge to build up evidence of the idea to perceive students' vocational knowledge as an ongoing process of contextualising. Furthermore, to build up evidence of the theory of contextualising not only contributes to learning theories, it provides information for the of design of vocational curricula and aligned teaching strategies to support students on their journey towards becoming adaptive, lifelong learning practitioners. My aim with the idea of contextualising is not about reinventing the wheel but rather an attempt to understand how it turns and how it functions. My intention with this thesis is to encourage dialogue and move the debate about the nature of vocational knowledge further, and hence, to provide some "food for thought"[9.]

9 Food for thought: anything that should be thought about or considered carefully. www.merriam-webster.com

Nederlandse samenvatting

(Summary in Dutch)

I n de hedendaagse context van het middelbaar beroepsonderwijs (mbo) wordt van studenten verwacht dat zij in uiteenlopende leeromgevingen verschillende soorten kennis opdoen en betekenis geven aan deze kennis. Beroepskennis wordt in dit proefschrift opgevat als een samenvoeging van allerlei soorten kennis ten dienste van de beroepsuitoefening. Beroepskennis stelt studenten (als toekomstig beroeps-beoefenaren) in staat te kunnen denken en handelen tijdens de beroepsuitoefening. Hoewel in de onderzoeksliteratuur inzichten in leerprocessen en kennisontwikkeling van studenten veelvuldig zijn besproken en bediscussieerd (Baartman & De Bruijn, 2011; Lobato, 2006; Schaap, De Bruijn, Van der Schaaf & Kirschner, 2009; Young, 2008; Wheelahan, 2015; Winch, 2013), zijn deze inzichten vaak gebaseerd op dicho-tomieën zoals theorie versus praktijk of algemeen versus specifiek. Echter, beroeps-kennis is meer dan het samenvoegen van stukjes theoretische en praktische kennis.

Beroepskennis wordt gekenmerkt door een nauwe verbondenheid tussen kennis en handelen. Beroepsbeoefenaars worden in de dagelijkse praktijk voortdurend uitgedaagd om allerlei ad-hoc beslissingen te nemen die directe gevolgen kunnen hebben voor de uitvoering van het werk. Het inspelen op onverwachte situaties met soms beperkte informatie is kenmerkend voor de praktijk van beroepsbeoefe-naars. Hierdoor wordt van hen verwacht dat zij tijdens de beroepsuitoefening hun kennis en het handelen continu op elkaar afstemmen. Beroepskennis ontwikkelt zich dan ook tijdens het handelen en krijgt betekenis door de interpretaties die beroepsbeoefenaars eraan geven. Kortom, denken over leren en beroepsken-nis in termen van dichotomieën doet geen recht aan de complexe aard ervan.

Tot op heden hebben (onderwijskundige) wetenschappers geen overeenstem-ming bereikt over hoe de complexe aard van beroepskennis gedefinieerd zou moeten worden, om recht te doen aan de soms nauwe verbondenheid tussen kennis en handelen. De kern van dit proefschrift is dan ook gericht op het grip krijgen op de ontwikkeling van beroepskennis van mbo-studenten. Om beroeps-kennis van mbo-studenten beter te begrijpen wordt in dit proefschrift vanuit ver-schillende invalshoeken naar het concept gekeken. Drie doelen staan centraal:

❶ Het conceptualiseren van de aard van beroepskennis van mbo-studenten;

❷ Het empirisch onderzoeken van de ontwikkelde theorie over de aard van beroepskennis, namelijk, te onder-zoeken en te illustreren hoe studenten beroepskennis ontwikkelen tijdens de beroepsuitoefening;

❸ Het empirisch onderzoeken van de inhoud van de beroepskennis van studenten, namelijk, het beschrijven en het illustreren van kenmerken van de beroepskennis van studenten.

In deze samenvatting worden de centrale bevindingen en de belangrijkste conclusies per hoofdstuk besproken. Aan het einde van het proefschrift wordt gereflecteerd op de vraag of de theoretische en empirische pogingen hebben bijgedragen aan het beter begrijpen van beroepskennis van studenten. De implicaties van de theorie van contextualiseren voor de onderwijspraktijk worden besproken.

Centrale bevindingen per hoofdstuk

Om de doelstellingen in dit proefschrift te bereiken zijn vier deelstudies opgezet en uitgevoerd. Deze studies en de resultaten staan beschreven in hoofdstukken 2 t/m 5. In **hoofdstuk 2** getiteld "De professionele keuken" wordt een surveystudie gepresenteerd naar "Krachtige leeromgevingen in het beroepsonderwijs" (De Bruijn, Overmaat, Glaudé, Heemskerk, Leeman, Roeleveld, & Van de Venne, 2005; De Corte, 1990). In het concept krachtige leeromgevingen is een theorie en een instrument gevonden om de context voor dit proefschrift te bepalen en om een case voor de deelstudies te selecteren. Aangenomen wordt dat, om beroepskennis van mbo-studenten te kunnen onderzoeken, een leeromgeving nodig is waarin studenten in aanraking komen met toekomstige beroepssituaties en waarin zij moeten functioneren als (beginnende) beroepsbeoefenaars.

In hoofdstuk 2 wordt eerst kort een schets gegeven van het mbo in Nederland alvorens het concept van krachtige leeromgeving te introduceren. Het mbo in Nederland wordt gekenmerkt door een breed scala aan verschillende domeinen, leerwegen en niveaus waardoor de beroepskennis in elk domein verschilt (De Bruijn, Billett, & Onstenk, 2017). Door een surveystudie uit te voeren in twee verschillende domeinen wordt verondersteld dat de kans wordt vergroot om een krachtige leeromgeving te vinden. Gekozen is voor de domeinen Bouw voor de opleidingen middenkaderfunctionaris bouw (n=56), en Horeca voor de opleidingen manager-ondernemer horeca (n= 35). Op basis van de resultaten van de surveystudie is de context voor het proefschrift bepaald en een case geselecteerd in het middelbare Horeca beroepsonderwijs bij de opleiding horecamanager-ondernemer niveau 4 en de opleiding zelfstandig werkend kok niveau 3. Aangenomen wordt dat de geselecteerde case, een zogeheten sandwich bar onderdeel van het restaurant van de campus, een krachtige leeromgeving biedt waar de cognitieve processen van studenten zichtbaar gemaakt kunnen worden om zo grip te krijgen op beroepskennis van studenten.

In **hoofdstuk 3**, getiteld "Een nieuwe stijl van koken", wordt het theoretisch kader van het proefschrift beschreven. In dit hoofdstuk worden verschillende wetenschappelijke opvattingen over beroepskennis besproken en wordt het idee van contextualiseren geïntroduceerd. Het idee van contextualiseren is afkomstig van Van Oers (1998a; 1998b) en wordt beschreven als een activiteit waarbij de lerende een concept in een andere beroepssituatie toepast waardoor de lerende het gebruik en de betekenis van dit concept verandert om het beter te laten aansluiten bij het doel in die nieuwe context. Dit idee van Van Oers is gebaseerd op de cultureel-historische activiteitentheorie (CHAT) (zie Van Oers 1998a; 1998b; Vygotsky, 1978). CHAT benadrukt de cruciale rol van activiteit (het handelen) in kennisontwikkeling (Cobb,

1994; Roth & Radford, 2010). Een activiteiten-theoretische kijk op beroepskennis helpt bij het begrijpen van de relaties tussen wat mensen denken (en voelen) en wat mensen doen (Daniels, Edwards, Engeström, Gallagher, & Ludvigsen, 2009). Het idee van contextualiseren wordt uitgewerkt en helpt bij het begrijpen van de complexe aard van beroepskennis omdat het zich concentreert op activiteiten en daardoor afstapt van dichotome manieren van denken over leren. Om op microniveau contextualiseren te kunnen beschrijven is het begrip aangevuld met ideeën ontleend aan de theorie van het inferentialisme zoals geïntroduceerd door Brandom (Bakker & Derry, 2011; Brandom, 1994; 2000). Inferentialisme is een filosofisch semantische theorie van betekenis geven en biedt een alternatieve manier om te kijken naar het cognitieve proces van betekenis geven. Het geeft een taal en theorie om te analyseren hoe de samenhang tussen concepten en tussen concepten en handelingen tot stand komt. Het biedt een manier om te focussen op de redenen die iemand geeft voor zijn handelen en op de inferentiële relaties tussen concepten en het handelen.

Met het samenvoegen van twee theoretische kijkkaders wordt het idee van contextualiseren opgevat als een cognitief proces van betekenis geven waarbij een student pendelt tussen het adequaat toepassen van concepten (kennis) en het verantwoorden van de toepassingen van deze concepten. Om het brede spectrum aan processen die relevant zijn voor contextualiseren te kunnen kenmerken worden de termen "concretiseren" en "conceptualiseren" geïntroduceerd. Concretiseren is een denkactiviteit waarbij een student uit een bepaalde situatie afleidt hoe concepten adequaat toegepast kunnen worden. Conceptualiseren is de denkactiviteit waarbij een student de betekenis van een concept begrijpt in relatie tot de betekenis van andere concepten. In dit hoofdstuk worden de begrippen concretiseren en conceptualiseren geïllustreerd met voorbeelden uit het culinaire beroepsonderwijs.

Met de uitwerking van het bestaande idee van contextualiseren van Van Oers (1998a; 1998b) en het versterken van deze theorie met het inferentialisme (Brandom 1994; 2000) is getracht een bijdrage te leveren aan het beter begrijpen van de complexe aard van beroepskennis en recht te doen aan de soms nauwe verbondenheid tussen kennis en handelen. In dit theoretische hoofdstuk kon alleen gespeculeerd worden over hoe studenten beroepskennis ontwikkelen. Het volgende hoofdstuk richt zich dan ook op het empirisch onderzoeken van beroepskennis van studenten tijdens de beroepsuitoefening.

Hoofdstuk 4 getiteld "Het bereiden en opdienen van de maaltijd" richt zich op de vraag "Hoe ontwikkelen studenten beroepskennis tijdens de beroepsuitoefening?" Het idee van contextualiseren als proces van het adequaat kunnen toepassen van concepten en het kunnen verantwoorden van de toepassing van deze concepten zoals gepresenteerd in hoofdstuk 3, vormt de theoretische basis waarop de ontwikkeling van beroepskennis van studenten in de praktijk wordt onderzocht. Om te kunnen onderzoeken hoe studenten beroepskennis ontwikkelen tijdens de beroepsuitoefening wordt contextualiseren opgevat als een participatief proces van redeneren. Dit betekent dat contextualiseren het adequaat toepassen van concepten benadrukt en dat de inferentiële relaties tussen concepten kan worden verklaard door het vermogen van een student om aan anderen uit te leggen en te verantwoorden wat de redenen zijn voor wat hij/zij doet (Bakker & Derry, 2011).

Om het cognitieve proces van betekenis geven van studenten zichtbaar te maken is op basis van de resultaten uit een pilotstudie gekozen voor de methode van reflection in action (Schön, 1983). Dit betekent dat twee interviewers (een docent en de onderzoeker) studenten horecamanager-ondernemer en studenten zelfstandig werkend kok tijdens hun werk in een sandwich bar hebben gevraagd om redenen voor hun handelingen te articuleren en deze te verantwoorden. Deze methode sloot goed aan bij de theorie van contextualiseren opgevat als participatief proces van redeneren en bij de praktijk omdat door te reflecteren in actie studenten dicht bij de eigen beleving en ervaringen konden blijven en als bijkomend voordeel, hun dagelijkse routine zo min mogelijk werd verstoord.

Om het abstracte concept contextualiseren in de praktijk te onderzoeken, werden de redeneeractiviteiten analytisch onderscheiden als "concretiseren" en "conceptualiseren". Echter, de resultaten laten zien dat in de praktijk deze activiteiten soms onlosmakelijk met elkaar te zijn verbonden en het niet altijd duidelijk is of een reden hoofdzakelijk theoretisch gerelateerd of praktisch gerelateerd is. De belangrijkste bevinding in dit hoofdstuk is de beschrijving en de illustratie van contextualiseren als een continue golfbeweging van redeneeractiviteiten waarin een student pendelt tussen het concretiseren van kennis en het veralgemeniseren van kennis.

Het proces van contextualiseren stelt studenten in staat samenhang aan te brengen in denken en handelen tijdens de beroepsuitoefening. Wanneer in het onderwijs de activiteit van contextualiseren als een bepalende activiteit voor de ontwikkeling van beroepskennis wordt gezien, ligt hier een uitdaging voor zowel vervolgonderzoek als voor het ontwerp van onderwijs. Een interessante focus voor vervolgonderzoek zou zijn welke vereisten aan het ontwerp van onderwijs en specifiek aan docenten en opleiders moet worden gesteld om het proces van contextualiseren te ondersteunen bij studenten tijdens de beroepsuitoefening om de ontwikkeling van beroepskennis te stimuleren.

Nadat de vorige twee hoofdstukken inzicht hebben gegeven in de aard van beroepskennis en hoe studenten beroepskennis ontwikkelen, staat in **hoofdstuk 5** getiteld "De bronnen van een chef-kok", een empirisch onderzoek naar de inhoud van de beroepskennis van studenten centraal. De vraag die wordt beantwoord is: "Hoe kan de beroepskennis van studenten gekenmerkt worden?" Uitgaande van het idee dat beroepskennis opgevat wordt als een voortdurend proces van betekenis geven wordt in deze studie een momentopname (een snapshot) van het proces van contextualiseren gemaakt om te onderzoeken hoe de beroepskennis van studenten gekenmerkt kan worden.

Om de inhoud van beroepskennis van studenten te onderzoeken wordt gebruik gemaakt van een analytisch kader ontwikkeld door Schaap en collega's (2011) in de mbo-con-texten van ICT en Maatschappelijk Werk. Dit kijkkader bestaat uit twee dimensies die gebruikt worden om kenmerken van beroepskennis te beschrijven. Dimensie I bevat zes beroepsspecifieke kenniscomponentenen, namelijk kennis van 1) technische-instrumentele processen, 2) de doelgroep, 3) de sociale omgeving, 4) de organisatorische structuur, 5) de beroepsgroep en 6) persoonlijke ontwikkeling en dimensie II bevat vier kwaliteiten van beroepskennis, namelijk de kwaliteiten rijkheid, concreetheid, complexiteit en speci-ficiteit. Door beroepsspecifieke kenniscomponenten te specificeren in de beroepskennis

van studenten, krijgt de beroepskennis voor een bepaald beroep betekenis, in dit geval voor horeca en culinair onderwijs. Het specificeren van kwaliteiten in beroepskennis zoals de rijkheid en complexiteit van beroepskennis geeft zicht op de reikwijdte en relevantie van de beroepskennis van studenten (De Jong & Ferguson-Hessler, 1996).

Tijdens reflection in action-interviews (zie hoofdstuk 4) zijn video-opnames van het redeneer-proces van studenten gemaakt. In totaal zijn 1397 articulaties verzameld en geanalyseerd om vervolgens 944 articulaties te coderen met het tweedimensionale model van Schaap en collega's (2011). De articulaties zijn verzameld bij studenten die werkzaam waren in de sandwich bar en bereid waren deel te nemen aan het onderzoek. Deze studenten behoorden tot een grotere groep mbo-studenten horecamanager-ondernemer niveau 4 (n=56) en mbo-studenten zelfstandig werkend kok niveau 3 (n=72). Gedurende een periode van zes weken beheerden zes tot acht studenten de sandwich bar beheerden.

In het afsluitende deel van dit hoofdstuk worden de resultaten en de uitdagingen van dit onderzoek uitgebreid besproken en worden de betekenis van de opbrengsten voor de onderwijspraktijk gepresenteerd. Zo staat de invloed van de interveniërende rol van de interviewers centraal, net als de belangrijke bevinding van het hoge aantal articulaties van studenten die betrekking hebben op het eerste beroepsspecifieke kenniscomponent, namelijk kennis met betrekking tot technische-instrumentele processen. Dit resultaat doet vermoeden dat kennis van primaire activiteiten, bijvoorbeeld kennis over smaak, ingrediënten en productpresentatie, toegankelijker zijn voor studenten tijdens de beroep-suitoefening en zij zich dit soort kennis gemakkelijker kunnen voorstellen dan de meer abstracte, algemene of theoretische denkbeelden die gekoppeld kunnen worden aan een praktijksituatie. Vervolgonderzoek moet uitwijzen of ook het soort kennis onderliggend aan het handelen in de beroepspraktijk kan worden geactiveerd, zoals bijvoorbeeld scheikundige kennis die de samenhang van ingrediënten in een saus kan verklaren.

UITDAGINGEN

In het afsluitende hoofdstuk van het proefschrift, **hoofdstuk 6** getiteld "Een beoordeling van het menu van morgen" worden de belangrijkste conclusies getrokken, en de theoretische en praktische uitdagingen van het onderzoek worden besproken. Er wordt een methodologische zoektocht beschreven die is uitgevoerd om de meest geschikte methode(n) te selecteren om beroepskennis van studenten zichtbaar te maken (voorafgaand aan de studies in hoofdstuk 4 en 5). In dit laatste hoofdstuk worden de implicaties van de bevindingen in het proefschrift voor de onderwijspraktijk besproken. Het hoofdstuk sluit af met suggesties voor vervolgonderzoek.

Een theoretische uitdaging

De theoretische uitdaging van dit proefschrift kan gevonden worden in de bijdrage aan de discussie rondom het theoretiseren van de aard van beroepskennis in minder dichotome denkwijzen. Een laatste theoretische uitdaging die wordt aangegaan in dit afsluitende hoofdstuk is om de theorie van contextualiseren in de bredere context te plaatsen van aanverwante debatten en onderzoeken rondom leerprocessen in het beroepsonderwijs. De theorie van contextualiseren wordt geplaatst in de door Sfard (1998) geïntroduceerde grondmetaforen waarin leertheorieën gevangen lijken te zitten, namelijk de acquisitiemetafoor en de participatiemetafoor. Bij de acquisitiemetafoor ligt de focus op een individuele cognitieve activiteit (cognitieve/ constructivistische leertheorieën) waarbij kennis als individueel eigendom wordt gezien, waar bij de participatiemetafoor het sociale aspect van leren benadrukt wordt en leren wordt beschouwd als participeren in een gemeenschap (sociaal-culturele leertheorieën). In dit hoofdstuk wordt beargumenteerd hoe de theorie van contextualiseren versterkt met inferentialisme kan worden opgevat als een perspectief waarbij het individuele aspect (acquisitie) en het sociale aspect (participatie) van leren geïntegreerd kunnen worden in één theorie, namelijk contextualiseren opgevat als een socio-cognitieve activiteit van betekenis geven.

De gepresenteerde alomvattende kijk op beroepskennis in termen van een doorlopend proces van contextualiseren doet recht aan de complexe aard van beroepskennis en het kenmerkende aspect van de soms nauwe verbondenheid tussen kennis en handelen. Er kan geconcludeerd worden dat bij het gebruik en de ontwikkeling van beroepskennis, de theorie van contextualiseren niet alleen van toepassing is voor studenten maar dat de theorie relevant is voor alle beroepsbeoefenaars.

Een methodologische zoektocht

Om de meest geschikte methode of methoden te vinden om "in het hoofd" van studenten te komen om grip te krijgen op beroepskennis en beroepskennis vanuit verschillende invalshoeken te kunnen onderzoeken, is voorafgaand aan de empirische studies beschreven in hoofdstuk 4 en 5, een methodologische zoektocht uitgevoerd. In deze zoektocht zijn methoden uitgeprobeerd in verschillende leeromgevingen bij de twee instituten die in de surveystudie uit hoofdstuk 2 als meest krachtig waren geclassificeerd. Drie pilotstudies zijn uitgevoerd waarbij de methoden zijn uitgeprobeerd van stimulated recall interviews

met video-opnames (Meijer et al., 2004; Van Kan et al., 2010), auto-photography (Fox-Turnbull, 2011) waarbij studenten zelf foto's moesten maken van betekenisvolle momenten gedefinieerd als "oeps- en aha-momenten" (Heusdens et al., 2014) en technieken van hardop denken (Koopman, Teune, & Beijaard, 2012). De lessen die geleerd zijn van deze methodologische zoektocht worden besproken, net als de keuze voor reflection in real-time action. Ook worden aanbevelingen gedaan voor vervolgonderzoek naar het gebruik van ICT-middelen in onderzoek naar leerprocessen van studenten, een nog weinig onderzocht maar potentieel waardevol onderwerp van onderzoek.

Uitdagingen voor de onderwijspraktijk

Op basis van de bevindingen uit de verschillende studies zijn een aantal implicaties voor de onderwijspraktijk te benoemen. Eén van de bevindingen is het inzicht dat studenten niet spontaan contextualiseren tijdens de beroepsuitoefening. Dit resultaat impliceert dat hier een belangrijke rol voor docenten en opleiders ligt om studenten uit te nodigen, te ondersteunen en te coachen om te contextualiseren tijdens de beroepsuitoefening (De Bruijn, 2012). Een onverwachte maar veelbelovende opbrengst is het ongeplande directe effect op het handelen van docenten geweest. Docenten die aanwezig waren in de sandwich bar tijdens de dataverzameling en de docent in de rol van interviewer vertelden dat zij door het onderzoek anders zijn gaan kijken naar hun rol tijdens het begeleiden van studenten in een praktijknabije leeromgeving zoals de sandwich bar. Deze ervaringen bevestigen het belang van een goede implementatie van de dimensie begeleiding in het ontwerp van leeromgevingen zoals beschreven in het concept van krachtige leeromgevingen in het beroepsonderwijs (zie hoofdstuk 2). De gepresenteerde opvatting over beroepskennis heeft niet alleen implicaties voor de rol van de begeleiding maar ook voor het beoordelen en toetsen van beroepskennis (Baartman & Gulikers, 2014). Het tweedimensionale model uit hoofdstuk 5 is een voorbeeld van een potentieel instrument voor zowel docenten, opleiders als voor studenten waarmee het leerproces niet alleen gemonitord zou kunnen worden maar ook beoordeeld. Een interessante focus voor vervolgonderzoek zou zijn de mogelijkheden te onderzoeken van een dergelijk instrument als assessmenttool in het beoordelen van het leren van mbo-studenten.

Door contextualiseren op te vatten als een belangrijke activiteit bij het gebruik en de ontwikkeling van beroepskennis impliceert dat het onderwijs de taak heeft om studenten kansen te bieden waarin geleerd kan worden om kennis en handelen op elkaar af te stemmen. Studenten moeten mogelijkheden geboden worden om te leren voorbij te gaan aan hun individuele ervaringen en deze ervaringen te leren verankeren in een bredere context van betekenis (Wheelahan, 2015). Dit betekent dat leren niet fragmentarisch zou moeten worden georganiseerd (Zitter & Hoeve, 2012) en afgestapt moet worden van het beeld waarin studenten op school voornamelijk theoretische kennis aangereikt krijgen en in de beroepspraktijk kennis vooral beschreven wordt in termen van taken, rollen en verantwoordelijkheden (Wheelahan, 2007).

AFSLUITENDE OPMERKINGEN

In de laatste paragraaf van het proefschrift worden enkele suggesties voor vervolgonderzoek gedaan. Een voor de hand liggende suggestie is om in andere domeinen beroepskennis van studenten te onderzoeken. Hierdoor kan de theorie van contextualiseren gevalideerd worden en de overdraagbaarheid ervan naar andere domeinen worden onderzocht (Cohen et al., 2011). Een punt van aandacht is de nadruk op concepten in de theorie van contextualiseren. Door de nadruk hierop te leggen zijn niet alle aspecten die relevant zijn voor beroepskennis onderzocht, aspecten zoals het hebben van een voorgevoel of je intuïtie volgen of menselijke zintuigen zoals smaakzin, tastzin, gezichtsvermogen. Hoewel deze aspecten een belangrijke rol spelen in de ontwikkeling van studenten naar het worden van autonome beroepsbeoefenaars, zijn ze in dit proefschrift niet onderzocht (Harteis, Koch & Morgenthaler, 2008; Harteis & Billett, 2013). Nader onderzoek hiernaar kan bijdragen aan het volledig begrijpen van leerprocessen van studenten in het mbo tijdens de beroepsuitoefening. Een laatste punt van aandacht is het concept van webs of reasons. Dit concept is in het theoretisch kader geïntroduceerd maar in de empirische studies niet verder onderzocht. Dit komt mede doordat de theorie nog in opbouw was ten tijde van de dataverzameling. In het concept webs of reasons ligt echter wel een theorie en instrument waarmee vervolgonderzoek zou kunnen kijken naar hoe de activiteit van contextualiseren is gelinkt aan de redenen en handelingen in webs of reasons van studenten. Op deze manier kan er meer zicht komen in hoe studenten samenhang aanbrengen tussen wat zij weten en wat zij doen.

In dit proefschrift hebben de theoretische en empirische pogingen bijgedragen om grip te krijgen op beroepskennis van beginnende beroepsbeoefenaars. Het doel om het idee van contextualiseren te introduceren was niet om het wiel opnieuw uit te vinden, het is eerder een poging geweest om te begrijpen hoe het draait en functioneert. Mijn bedoeling met dit proefschrift is om de dialoog over leerprocessen in de context van het mbo aan te moedigen en het debat over de aard van beroepskennis verder te brengen. Kortom, het proefschrift levert leesvoer en denkwerk.

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About
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& Author's publications list

ABOUT THE AUTHOR

Wenja Heusdens was born on January 7th, 1975 in Haarlem (The Netherlands). She graduated from higher general secondary education at the Coornhert Lyceum in 1993. After one year devoted to Liberal Arts school (Vrije Hogeschool Driebergen), she started her bachelor in Social Work (SPH) at the HU University of Applied Sciences Utrecht in 1994, resulting in a bachelor degree in 1998. Wenja started her professional career in the field of child and adolescent psychiatry and simultaneously attended a post-bachelor study in Pedagogy. In 1999, she switched to the University of Amsterdam, to attend a study fulltime at the department of Educational and Social Sciences. During her master degree Child Development and Education, she spent two months at the Stanford University in Palo Alto, California to collect data for her master thesis; a collaborative, comparative research project on students' motivation to learn in school in the USA, Russia and the Netherlands. Wenja graduated in 2001.

After several different jobs, Wenja started to work in 2003 as a teacher in special pre-vocational education, an institute for adolescents with educational needs. During her teaching, she attended the primary teacher training program (Pabo) and graduated in 2005 at the Amsterdam University of Applied Sciences. In 2007, she applied at the HU University of Applied Sciences Utrecht as a lecturer at the Pabo and teacher-researcher at the research group Special Educational Needs (SEN). She dedicated two consecutive summers to teaching international students about educational needs in an exchange program in Utrecht and the following two years in Porto (Portugal).

In 2008, Wenja continued her work at the Pabo and switched from the research group SEN to the research group Vocational Education, where she took part in an innovative research project on teachers in pre-vocational education. In 2011, she started her PhD research on students' vocational knowledge, a joint Doctorate between the Utrecht University and HU University of Applied Sciences Utrecht. She presented her research at national (ORD) and international conferences (EARLI). In her final year of the PhD-project, Wenja switched to the research group vocational education, and to date, continues her work as a researcher and a teacher trainer at a master program for teachers in vocational and higher education.

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"Je kunt niet meer dan je best doen…"

JAN HEUSDENS (1910-1986)

Ik draag dit proefschrift op aan:

MIJN VADER EN MOEDER
VOOR JULLIE ONVOORWAARDELIJKE STEUN

JEROEN
VOOR JOUW ONUITPUTTELIJKE AANMOEDIGING

Dankwoord

(Acknowledgements)

DANKWOORD
(Acknowledgements)

In dit dankwoord wil ik graag verschillende mensen bedanken die ieder op hun eigen manier een bijdrage hebben geleverd aan de totstandkoming van dit proefschrift.

Allereerst gaat mijn dank uit naar de studenten die hebben deelgenomen aan de verschillende studies. Tot vervelens toe waren jullie bereid mij jullie redenen voor het handelen te verwoorden. Zonder deze bereidheid was dit proefschrift er nooit gekomen. Net als de hulp van zowel de directies, team-coördinatoren als docenten van de deelnemende ROC's. Hierbij gaat een speciaal dank gaat uit naar Marc, Peter, Twan en Thomas. Wat hebben jullie mij warm onthaald en wat ben ik dankbaar dat ik letterlijk een kijkje in jullie keuken heb mogen nemen! Ook gaat mijn dank uit naar Wichert en de Hogeschool Utrecht voor de ondersteuning tijdens mijn promotietraject.

Ik dank de leden van mijn promotiecommissie:
Prof. dr. Paul Leseman, Universiteit Utrecht
Prof. dr. Liesbeth Kester, Universiteit Utrecht
Prof. dr. Cok Bakker, Universiteit Utrecht
Prof. dr. Sanne Akkerman, Universiteit Leiden
Prof. dr. David Guile, University College London

Elly, als mijn promotor dank ik je voor het mij opnieuw aanbieden van deze kans en het vertrouwen wat je mij hiermee hebt gegeven. Ik heb veel geleerd van de grondigheid en nauwkeurigheid waarmee je te werk gaat. Liesbeth, als mijn dagelijks begeleider wil ik jou bedanken voor onze inhoudelijke gesprekken en de persoonlijke benadering. Je was altijd bereikbaar voor een vraag en nam de tijd om mij weer wat moed in te spreken. Ik dank jullie beiden voor het enthousiasme waarmee wij als team aan dit onderzoek hebben gewerkt!

Mieke, ik dank jou voor het meedenken in het eerste jaar van het promotietraject, jouw invalshoek gaf een verfrissende kijk op het geheel. Arthur, dank voor het tijdelijk vervullen van de rol van dagelijks begeleider en voor jouw rol als critical friend. Je hebt een enorme bijdrage geleverd en verdieping gegeven aan mijn promotietraject.

Mijn paranimfen, Pauline en Anouk wil ik graag bedanken voor hun ondersteuning. Met elk van jullie deel ik inmiddels al een lange geschiedenis. Pauline, samen met Kees stond jij aan het begin van mijn wetenschappelijke ambities. Kees zag als eerste iets in mijn capaciteiten als onderzoeker en stuurde mij naar Rob, naar de Stanford University. Tijdens deze onvergetelijke reis groeide mijn interesse voor het doen van onderzoek en daarna bracht Kees ons samen in ons eerste onderzoeksproject. Je bent al die jaren een geweldige critical friend en een groot voorbeeld wat betreft onbaatzuchtige behulpzaamheid. Anouk, wij volgen elkaars levens al sinds de basisschool, je bent mijn 'oudste' vriendin. Ik ben dan ook echt trots dat jij ook nu weer bij deze belangrijke gebeurtenis in mijn leven naast mij staat. Ik bedank je voor je altijd oprechte interesse en de diepgang van onze vriendschap.

Mijn collega's van het Lectoraat Beroepsonderwijs dank ik en in het bijzonder Karin, voor jouw hulp bij mijn vele ondersteunende verzoeken en jouw relativering op z'n tijd. En Ilya, dank voor onze gesprekjes bij het koffiezetapparaat waarbij jij mij regelmatig geholpen hebt woorden te geven aan de gedachten die door mijn hoofd rondzwierven. Mijn mede-promovendi, Sue, Nienke en Remco wil ik graag bedanken voor zowel de lach als de traan die wij tijdens deze reis met elkaar hebben gedeeld. Jullie waren onmisbaar en ik hoop dat we de lunches, borrels en etentjes blijven voortzetten!

Mijn vrienden ben ik dank verschuldigd. In het bijzonder de Haarlemse meiden, mijn Amsterdamse vrienden en de Delftse bende. Dank jullie allen voor het steeds weer willen aanhoren van mijn verhalen over mijn promotieonderzoek, voor het inspreken van moed op de juiste momenten, voor de netwerktips én voor de avondjes uit ter ontspanning, die waren soms hard nodig... Een speciaal dank gaat hierbij uit naar Arjen en Martijn. Niet alleen voor het deelnemen aan één van de pilotstudies maar ook voor onze eindeloze interessante gesprekken over onderwijs en het kritisch meedenken over mijn onderzoek, zelfs op onze vakanties...

Lieve familie, Arjan en Karianne, dank voor jullie steun. En Mamma, jou ben ik zo veel dank schuldig dat is niet in woorden uit te drukken. Niet alleen heb jij mij geleerd dingen uit en op te zoeken, je hebt mij vooral geleerd om niet op te geven. Zie hier het resultaat! Helaas is mijn vader er niet meer om het eindresultaat te bewonderen. Gelukkig heeft mijn vader nog wel de beoogde datum van de promotie meegekregen. Pappa, ik dank je voor al jouw liefde en ondersteuning. Wat was je trots op mij en wat was dat fijn om te voelen. Dank Pap en Mam, voor jullie onvoorwaardelijke steun!

En als kers op de taart, Jeroen. Samen hebben wij besloten dit avontuur aan te gaan en halverwege deze reis kwam daar onze prachtige zoon Sieco bij, ons zonnetje in huis. Af en toe was het een welkome afleiding wanneer Sieco op mijn schoot kroop en zei dat hij wel even zou meehelpen met typen. Lieve Jeroen, dit promotietraject had ik nooit zonder jou kunnen doen. Door jouw geduld, begrip, ondersteuning, waardevolle input en doordat jij zo in mij gelooft heb ik deze reis tot een goed einde kunnen volbrengen. Duizendmaal dank voor jouw onuitputtelijke aanmoediging!

What a ride!
Eén om nooit te vergeten...

UNDERSTANDING STUDENTS' VOCATIONAL KNOWLEDGE IS AT THE HEART OF THIS THESIS ON STUDENTS' LEARNING PROCESSES IN THE CONTEXT OF DUTCH SENIOR SECONDARY VOCATIONAL EDUCATION AND TRAINING (VET)

processes articulating vocational knowledge contextualising concretising conceptualising inferentialism philosophical theory education studen