Comprehensive competence-based vocational education

The development and use of a curriculum analysis and improvement model

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Woord vooraf

Wie in 2008 tegen mij had gezegd dat ik in 2010 een kind zou hebben en mijn proefschrift zou afronden, had ik in die tijd volledig voor gek verklaard. Ik was druk met projecten en onderwijs en op de achtergrond speelde de promotie. En als iemand mij vroeg naar kinderen dan zei ik standaard: 'Later als ik groot ben'. Maar zie hier, het proefschrift is af en Max is ondertussen al bijna een jaar! Wat kunnen dingen toch ineens snel gaan. Dit proefschrift heb ik natuurlijk niet alleen maar aan mezelf te danken. Martin, jij vroeg me ooit mee te gaan naar Wageningen. Ik dacht: 'Wageningen?!', maar eenmaal aan het werk in Wageningen bleek dat ik de combinatie van onderwijskunde en het agrarische erg interessant vond en Martin, jij schepte alle ruimte voor mij om leuke dingen te doen. Zo heb ik het altijd ervaren, het werken is leuke dingen doen! Dank voor je vertrouwen en de ruimte die je me geeft om mezelf te ontwikkelen. Een ander belangrijk persoon in het proces van het doen van onderzoek (en in latere instantie schrijven van een proefschrift) was Harm. Harm, altijd heb je op een kritisch en constructieve wijze naar mijn stukken gekeken. En mocht ik onverhoopt toch een keer het werken wat minder leuk vinden, wist je dat altijd te relativeren. Dank daarvoor. En tot slot Judith, jij kwam enkele jaren geleden invliegen. Een welkome aanvulling bij de afronding van mijn proefschrift. Ik weet niet hoe je het doet, maar je houdt overzicht, let op de details, geeft tips om de zaken te verbeteren en het is ook nog eens de volgende dag af. Bijzonder bedankt voor je ondersteuning. Ik hoop dat ik met jullie alledrie nog interessante projecten mag gaan doen.

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Renate Wesselink
Apeldoorn, oktober 2010

Contents

Chapter 1

General introduction

While competence-based education is a popular development, it remains unclear as to what exactly the term means and what this form of education should look like in practice. Naturally, this causes a great deal of confusion. It is the aim of the studies described in this thesis to dispel this confusion. This thesis clarifies what competence-based education means in theory and examines how competence-based education manifests itself in educational practice. As competence is both multi-dimensional and complex to understand, the concept of competence is first defined to pave the way for the conceptualisation and operationalisation of competence-based education. This introduction opens with a description of the developments in today's society that might explain why competence-based education is a popular concept. It closes with a description of the scope and context of this thesis and an outline of its content.

Introduction

Competence-based education is a popular educational innovation in vocational education in the Netherlands. It is expected to better prepare students for the current and future labour market and for society as a whole and to make education more attractive to students in the hope that fewer students will quit before attaining their qualifications. Yet competence-based education is a container concept and there is no consensus about what exactly is meant by it, neither in theory nor in practice. Competence-based education is often used as a catch-all term to refer to many different forms of education (Van der Klink, Boon and Schlusmans, 2007). The definitions in circulation differ widely and most have been formulated from a theoretical rather than an empirical position (Van den Berg and De Bruijn, 2009). Despite the conceptual confusion, competence-based education is being applied widely in educational practice. So how does it manifest itself in practice? The lack of an accepted definition leaves scope for practitioners to claim they are working in a competence-based manner while continuing to work according to traditional principles (i.e. 'window dressing', Van der Klink and Boon, 2003). In some cases, existing methods and management instruments have been relabelled with the term 'competence' to suggest a halo of progressiveness and excellence (Stoof, Martens, Van Merriënboer and Bastiaens, 2002). Conversely, practitioners whose work is actually based on competencies do not always recognise this or claim to work accordingly. Thus, besides conceptual clarity, clarity in practice is also needed. The conceptualisation and operationalisation of competence-based education and the way in which it manifests itself in educational practice are addressed in this thesis.

Developments in today's society

The move towards competence-based education got underway before it was known exactly what it comprises or what it should look like in practice. Competence-based education has gained in popularity because it is expected to be able to stimulate learning that prepares students properly for today's society (Velde, 1999; Mansfield and Mitchell, 1996; Westera, 2001) better than traditional vocational education (i.e. aims at transferring knowledge and skills from one person to another) does. Today's society is changing and developing at an increasing rate (Harrison and Kessels, 2004; Kirschner, Vilsteren, Hummer and Wigman, 1997). Consequently, companies must adapt to changes, among them changing consumer behaviour, tighter environmental regulations, new requirements for product quality, chain management and food safety, and developments in sustainability. Working in a company requires individuals to adapt to these changing requirements or, preferably, to respond proactively to them (Hager, 2004). Individuals are compelled to regard themselves as being self-employed as they are expected to manage their own careers (Patton and McMahon, 2006). They have to be prepared for a 'boundaryless career' (Defillippi and Arthur, 1994), which means that they cannot rely on a traditional career that is characterised by having 'a job for life'.

Work is not the only aspect of life that is becoming more complex. Being a member of society is also increasingly difficult. Globalisation is now a characteristic of our society while, at the same time, society is becoming increasingly individualised. Furthermore, the expectations of individuals in society are increasingly demanding. For example, technology is changing fast and to remain able to deal with the latest technologies (e.g. online social networks) individuals have to develop constantly. Preparing young people to successfully face the challenges of both society and the world of work and to take full advantage of the opportunities these provide has become an important objective of the educational systems in Europe (Eurydice, 2006).

In the Netherlands, competence-based education is a leading paradigm on the innovation agendas of institutions for vocational education (Van der Sanden, De Bruijn and Mulder, 2003). Increasingly, too, other segments of education, such as academic education and in-service training, are redesigning their educational programmes on the basis of competencies. The forces and changes driving competence-based education are not national issues; they are discernible in other European countries, too (Mulder, Weigel and Collins, 2007). In particular, the European ambition as stated in the Lisbon agenda to become the most dynamic and competitive region in the world puts vocational education in various European countries under pressure (Deitmer, Nyhan and Manning, 2005 in De Bruijn, 2007). Descy and Tessaring (2001) compiled an inventory of competence-based or comparable educational innovation activities underway in European countries. In many European countries, including France, the UK, Denmark and Germany, educational institutions are experimenting with new educational models and objectives. At the European level, a qualification framework (EQF) has been developed that is based on learning outcomes defined in the form of competencies. Another EU example of a competence framework construction is the European Credit System for vocational education and training (ECVET), whose goal is to achieve enhanced cooperation in vocational education and the harmonisation of higher education through the creation of a set of reference levels. Several examples of innovation can also be found beyond the EU. The International Labour Organization (ILO) is helping vocational training institutions in Latin America to modernise their programmes using the competence-based approach. Organisation for Economic Co-operation and Development (OECD) member countries have launched the Programme for International Student Assessment (PISA) with the aim of monitoring the extent to which students nearing the end of compulsory schooling have acquired the key competencies for full participation in society (Rychen and Salganik, 2003). UNEVOC is supporting the training of professionals in Africa and Asia through the development of competence-based vocational education (Mulder, Weigel and Collins, 2007). Competence-based education models are to be found all over the world but what competence-based education looks like differs from country to country as does the degree to which competence-based education is being applied (Velde, 1999).

Thus, although competence-based education is a major innovation in various countries, several questions need to be answered before conclusions can be drawn as to whether or not competence-based education can live up to the expectations.

The structure of this introduction

The concept of competence is explored in the next section of this introduction. This is a complex and multi-dimensional concept. Its elusive nature has contributed to the fact that an accepted definition of competence-based education has not yet been adopted. Subsequently, various conceptualisations of competence are presented before the definition of competence as used in this thesis is explained. Next, the context in which the studies were carried out – vocational education for life sciences in the Netherlands and the scope of this thesis are described. This introduction concludes by presenting an overview of the research questions central to this thesis and an overview of the chapters in which the various research questions are answered.

Various conceptualisations of competence and their relation to education

As mentioned above, various definitions of competence-based education are in circulation (Biemans, Nieuwenhuis, Poell, Mulder and Wesselink, 2004; Grant, Elbow, Ewens, Gamson, Kohli, Neumann, Olesen and Riesman, 1979). By way of example, the definition of Grant et al. (1979) is as follows, 'Competence-based education tends to be a form of education that derives a curriculum from an analysis of a prospective or actual role in modern society and that attempts to certify student progress on the basis of demonstrated performance in some or all aspects of that role' (Grant et al., 1979, p.6). The basic idea of competence-based education is that academic disciplines are no longer the starting point for curriculum development; they are replaced by the competencies needed for employment and to participate in society. Although the definition of Grant et al. is more than 30 years old, it still contains the essence of competence-based education. The concept of competence, by contrast, has been applied in widely differing ways in different countries (Gonzci, 1994) and at different times. It is this ambiguity that is one of the major pitfalls in working with competencies in educational programmes (Biemans et al., 2004). People conceptualise competence in different ways and this causes misunderstanding and confusion. According to Nijhof (2003), designing competence-based curricula can only be done fruitfully when competence is operationalised as unambiguously as possible. Knowing the various conceptualisations of competence enables practitioners and others who are involved in implementing or studying competence-based education to discuss thoroughly and realise a shared understanding of the concept of competence. This is a prerequisite for successfully implementing competence-based education and in turn study its effects.

The way in which competence-based learning is operationalised depends on the conceptualisation of competence. Three main conceptualisations can be distinguished: behaviouristic, generic and holistic. This following brief recent history of the concept of competence may give the impression that the concept originated solely within these three traditions. In fact, the concept has a much longer history (Kouwenhoven, 2003; Mulder, 2007). The concept of competence dates back to Persian (in the code of Hamurabbi), Greek (in Plato's Lydia) and Roman times (in general language). It has been used in Europe since the sixteenth century and it entered the professional literature of management (core competence,

competence management) and education and training (competence-based education) in the 1970s (Mulder, 2007).

The definition of competence as used in this thesis is derived from the holistic conceptualisation, owing to the reported shortcomings of the first two conceptualisations (i.e. behaviouristic and generic) in this list. Many authors warn that the conceptualisation of competence in behaviouristic and generic traditions falls short in addressing the developmental and situated nature of professional practice (Billett, 1994; Brown, Collins and Duguid, 1989; Cheetham and Chivers, 1996). Hodkinson and Issitt (1995) have identified two conceptualisations of holism. The first conceptualisation of holism concerns the integration of knowledge, understanding, skills and attitudes that are meaningful to someone who is (becoming a) practitioner. The second dimension of holism relates to the education and assessment processes that should be interrelated and take place in relevant practical situations. Moreover, competencies should be displayed in a context with an appropriate level of generality or holism (Hodkinson & Issitt, 1995). It is not sufficient to judge professional employees on their performance related to standards while omitting to include the complexity of practical situations.

Unlike the other two conceptualisations, the holistic conceptualisation focuses on the development of worker or student capabilities in relation to professional practice without defining long lists of atomised task elements. The behaviouristic conceptualisation of competence suffers the weakness of such lists, which have turned out not to be suitable for curriculum development and which lack the human factor that ought to be important in current times. The behaviouristic conceptualisation originated in the USA where competency (notice the 'y' as last letter) was a well-known concept as early as the 1960s and 1970s. In the USA in the 1960s performance-based teacher education was labelled as competency-based education (Olesen, 1979). During these years competency-based education was characterised by the detailed analysis of the behavioural aspects of professional tasks. These tasks were described in detailed lists of fragments and assessable elements. In the USA today the concept of competency is still characterised by a rather detailed and fundamentally behavioural approach (McClelland, 1998). Similarly, in the UK and Australia this conceptualisation of competence is recognisable within the national vocational qualification frameworks (Eraut, 2004; Hager, 2004). This tradition can be characterised as the description of discrete behaviours associated with the completion of each small task (Gonczi, 1994). It is not concerned with interconnections between tasks and the transfer from one situation to another. Evidence of competence is found on the basis of the direct observation of performance and the rationale behind the behaviour is left out of consideration. Job analysis plays a central role and involves the meticulous investigation of a job or occupation; it has a clear relationship with scientific management (Neumann, 1979) in that scientific management involves a set of principles that focuses on efficiency and the standardisation of work processes. This approach stems from the days when productivity was the most important of a factory's priorities, and the authenticity of human action was a neglected aspect of labour. These days, one of the fundamental criticisms of this conceptualisation is that by working solely with a list of

atomised work descriptions, the workers' identity and autonomy are ignored completely and the role of tacit knowledge is undervalued (Hager, 2004). Furthermore, this mechanistic view of work does not leave room to recognise that different workers accomplish a job with differing degrees of efficiency. Barnett (1994) asserts that competencies described in a behaviouristic way cannot provide guidelines for a meaningful educational curriculum due to the detailed level of description. And Hyland (1995) adds reasons, from the viewpoint of assessment, why behavioural objectives are not suitable for measuring competencies: not all learning outcomes are specifiable in behavioural terms and the emphasis on final outcomes undervalues the importance of the learning process. Competence-based education concerned only with performance outcomes pays no attention to previous experiences nor does it pay attention to students' competence development.

Where the weakness of behaviouristic conceptualisation is the level of detail, the most important drawback of the generic approach is the lack of any relationship with context. While it was an independent development, the generic conceptualisation of competence can also be seen as a response to the behaviouristic tradition because the generic approach aimed to overcome the need for detailed lists of competence aspects by using generic competencies. The generic conceptualisation, resulting from human resource activities in professional organisations, originated from the wish to distinguish between average managers and excellent managers (Eraut, 1994; Boyatzis, 1980). Central to these studies was the identification of generic competencies defined in terms of personal qualities or traits, such as critical thinking capacity or problem-solving capacity, that could justify the distinction. A difficulty with this model is that it assumes a single type of good practitioner, independent of context, which is not very likely (Eraut, 1994). In the context of realising education based on these generic competencies, Gonczi (1994) describes major criticisms of the generic conceptualisation: lack of evidence as the extent to which such 'generic' competencies really make the difference between excellent and average performers, reasonable doubts about the transferability of competencies from one situation to another, doubts about the learn ability of these competencies and the lack of any relationship with concrete situations. Owing to these reasons, it is difficult to use this conceptualisation to develop meaningful curricula. This conceptualisation is too general and lacks clear relationship with professional practice. The latter is necessary because development and assessment should take place within professional practice.

Biemans et al. (2004) indicate that nowadays most interpretations of competence are derived from a more holistic conceptualisation. Within this tradition the concept of competence is defined as follows, 'competence is the integrated performance-oriented capability of a person or an organisation to reach specific achievements. These capabilities consist of clusters of knowledge structures and cognitive, interactive, affective and where necessary psychomotoric skills, and attitudes and values, which are conditional for carrying out tasks, solving problems and effectively functioning in a certain profession, organisation, position and role' (Mulder, 2001, p.76). Although Mulder's research focused on human resource management and development in organisations, the definition also applies to

education since the support of competence development is key in both settings. When the definition is used in the educational setting it becomes possible to use competence as a tool to structure and facilitate communication between education and the labour market (Boon and Van der Klink, 2001).

In the holistic tradition, competence is defined in a way that points to a duality in its nature. It concerns the capabilities of a person (or organisation, but that is beyond the scope of this thesis) to fulfil certain tasks, roles or jobs. Hoffmann (1999) refers to this dual emphasis as the 'input' and 'output' approach towards competence. Mansfield (1994) sees it as the 'tasks people do' and 'personal capabilities'. Both Hoffmann and Mansfield use the concepts of tasks (output) and personal capabilities (input) as two distinctive operationalisations of competence. In this thesis these two operationalisations are integrated in the concept of competence. Both the individual's capabilities and tasks in practice are necessary in the case developing or assessing competencies. They are required to make the concept meaningful to curriculum development. An example of a competence for an environmental educator is as follows, 'the environmental education practitioner has to be able to clarify the exact question or problem of the organisation that has a request' (Wesselink and Wals, 2010).

A holistic conceptualisation of competence implies that teaching and assessment methods should be developed in which the elements of competence are developed and assessed simultaneously (Gonczi, 1994; Hager, Gonczi & Athanasou, 1994). This does justice to the integrated character. Viewed in this context, many educational programmes would require some amendment to ensure that they develop competencies. More traditional or conventional educational programmes are intended to transfer comparatively isolated knowledge elements and skills from one person to another without a strong relationship to practical contexts. When competence development is the ultimate goal, by contrast, educational programmes need a different look.

One can imagine that education that uses competencies derived from a holistic tradition as a starting point for curriculum development is different in many aspects from more traditional education as described above. How competence-based education can be defined in terms of underlying principles and how it manifests itself in educational practice is examined in this thesis. Before presenting the research questions of the various studies, the context in which the studies took place and their scope is described.

Context of this study

As the chapters 3, 4, 5 and 6 show, the studies conducted are inextricably interwoven with the context in which they were carried out. In view of this, this introduction provides a description of the context in which the studies were conducted. The context is vocational education for life sciences in the Netherlands.

Vocational education for life sciences in the Netherlands

The Dutch educational system involves eight years of general primary education, from the age of 4 until the age of 12 years. After completing primary education, pupils continue their

education in one of three ways: i) a four-year pre-vocational secondary education programme (in Dutch: VMBO); ii) a five-year senior secondary general education programme (in Dutch: HAVO); or iii) a six-year pre-university education programme or upper secondary general education (in Dutch: VWO). After completing one of these programmes, pupils have access to either university (having achieved VWO) or universities of applied sciences (in Dutch: HBO) provided they have achieved HAVO or VWO, or senior secondary vocational education (in Dutch: MBO) having achieved any one of the three secondary programmes.

VMBO aims to prepare students for MBO. MBO consists of four levels of increasing difficulty and leads to either a certificate that allows the student to enter the labour market or to HBO. For each MBO level there are in principle two learning pathways: i) vocational training (BOL in Dutch) in which practical training takes up between 20% and 60% of the programme; and ii) block or day release (BBL in Dutch) in which practical training takes up more than 60% of the programme. Figure 1.1 shows the complete educational system in the Netherlands (Eurydice, 2009).

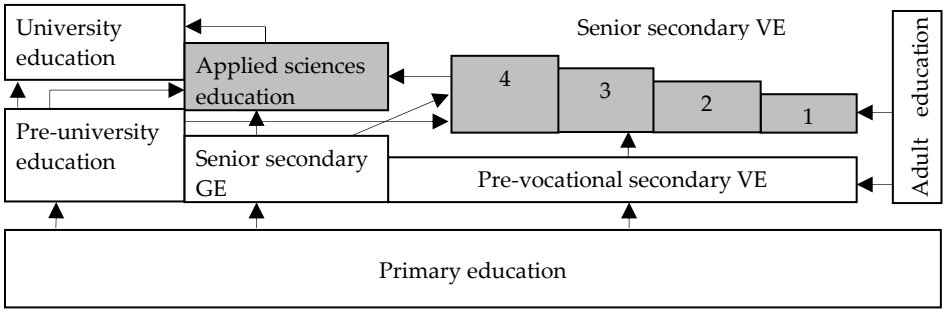

Figure 1.1 Overview of the Dutch formal educational system
GE = General education; VE = Vocational education

In the Netherlands, vocational education plays a significant part in the education of pupils. Some 60% of youngsters start their education in VMBO. Each year about 625,000 students aged 16 to about 20 years participate in MBO and 375,000 students aged 17 to 22 years participate in HBO.

The life sciences sector, which provides the context of this thesis, is no exception to the trend in the Dutch educational landscape for realising competence-based education. Each year about 70,000 students enrol in educational programmes (from VMBO to university) in life sciences in the Netherlands. These programmes concern traditional agricultural domains (e.g. plant and animal sciences) as well as other, sometimes relatively new fields in life sciences (e.g. nutrition, health, nature and the living environment). Educational programmes in life sciences are offered at all levels of vocational and higher education: VMBO, MBO, HBO, university education and post-graduate (adult) vocational education. In the coming years, the educational programmes of VMBO, MBO and HBO will be increasingly characterised by the use of competencies as a starting point for the development of curricula.

In this thesis the focus is on the vocational education forms of MBO and HBO (see the shaded areas in Figure 1.1). The general aim of these forms of vocational education is to enable the student to develop his/her talents and become a competent young professional able easily to adapt to a wide variety of jobs within his/her profession and able to participate fully in society. MBO and HBO prepare students either to start work in a job that suits their talents or to study at the next level.

MBO in the Netherlands is in a stage of transition (Nijhof and Van Esch, 2004). The traditional qualification structure upon which all educational programmes were based has changed into a competence-based qualification framework. The Dutch Department of Education, Culture and Science requires all MBO institutions to use competence-based qualification profiles as starting points for their curricula by 2011. The switch to this competence-based qualification framework was motivated by various factors, including the over-abundance of qualifications (over 700) and the inability of vocational education to respond quickly enough to changes in the labour market (Eurydice, 2006). Furthermore, innovations in the emergence of competence-based education were expected to better link educational programmes to job requirements and to close the gap that exists between the labour market and education (Biemans et al., 2004; Tillema, Kessels and Meijers, 2000). The new competence-based qualification framework, which has been developed in close collaboration with representatives of relevant fields of work, should be more relevant to the labour market and society, easier to use by educational institutions, more transparent and more easily recognisable to students and the labour market, as well as flexible and long-lasting (Eurydice, 2006).

An HBO master's degree is the culmination of a four-year programme that includes at least one practical training period of about six months. The Bologna Declaration can be seen as one of the reasons why HBOs decided to redesign their education and began using competencies as a starting point for their curricula. HBOs invited representatives of the labour market to join the process of formulating competencies that students would need upon entering the labour market. HBO institutions started the redesign towards competence-based education chiefly in order to bridge the gap between education and labour market and to better connect education to the individual learning needs of students. Unlike MBO, HBO institutions have no nationally developed competence-based qualification framework. They are responsible for developing their own profiles and they are free to decide how and to what extent they wish to embrace competence-based education.

Scope of the thesis

The studies described in this thesis were funded by the Department of Agriculture, Nature and Food Quality. By implication, only institutions providing education for life sciences were involved in these studies. In the Netherlands, these institutions are financed by the Department of Agriculture, Nature and Food Quality and are separate from all other institutions for MBO and HBO (i.e. nursing, administrating or construction) that are all financed directly by the Department of Education, Culture and Science. As a consequence,

this thesis does not aim to provide the reader with a representative picture of competence-based education in MBO and HBO in the Netherlands. All MBO institutions must work with a competence-based qualification framework as of 2011 and in this respect their situations may well be comparable. Furthermore, given the fact that the movement towards competence-based education is relatively new, and institutions are not yet obliged to have competence-based curricula, most educational programmes involved in the studies as reported in this thesis should be seen as front-runners at the time of the research. Given the stage of development and implementation of competence-based education, in which there were just a couple of examples of innovation actually taking place, the choice was made to focus on these front-runners. Here, indications were sought to illuminate 'the what, how and why' of this educational innovation and its development and implementation. Other educational institutions (sometimes referred to as 'the peloton') can learn from these innovative programmes and the account of them presented in this thesis.

Since the Department of Agriculture, Nature and Food Quality, as the financing body, stressed that institutions for life sciences education should benefit directly from the results of the research, the studies conducted for this thesis have predominantly an applied character. The study described in chapter 2 provides the exception to the rule. It concerns a set of principles for competence-based education developed on the basis of theory and expert consultation. Applied research is research that takes as its starting point the study community's accumulated prior knowledge, in this case educational methods for a specific purpose as determined by the community itself (Yin, 2002; Baarda, De Goede and Teunissen, 2001). As the studies conducted for this thesis inhabit a complex reality, it appeared at first sight difficult to apply strict research protocols. Although it is difficult to state the degree to which the results can be generalised, an advantage of applied research is that it has high ecological validity. It includes the complexity of actual practice with its actual problems and that makes it better possible to use the results of the studies in practice. This kind of research can bridge the gap so often experienced between research results and their application in practice.

As a consequence of the limited agreement about the concept of competence-based education among researchers and practitioners (Stoof et al., 2002), considerable differences also exist in the design of competence-based learning environments (Van de Berg and De Bruijn, 2009). Moreover, as mentioned above, many institutions for MBO and HBO have only recently started to switch towards competence-based education and are in the midst of a development and implementation process. Accordingly, graduate numbers are still low. While about 40% of MBO institutions is working with competence-based education few study programmes have been designed fully on the basis of competencies. Given this state of play, very little is yet known about the effects of competence-based education in terms of learning outcomes at the end of the educational programme (Koopman, 2010). These cannot be studied appropriately in this stage of implementation, nor can the longer-term effects on the labour market. Studies that are embedded in ongoing innovations within vocational education can play a significant role in enlarging the knowledge base regarding the implementation of

competence-based vocational education. The studies in this thesis should be seen in this light. Finally, on this point, the Dutch Department of Education, Culture and Science decided to require MBO institutions to work with the competence-based qualification framework as of 2011 without having much evidence about what effective competence-based education should look like and how this type of education actually affects students and the labour market. This lack of knowledge and evidence has caused a great deal of discussion in the Netherlands. The results of this thesis could be used to give nuance to ongoing discussions about the pros and cons of competence-based education.

Problem statement, research questions and overview of the thesis

As mentioned earlier, several countries started developing competence-based education without having a clear conceptualisation of what exactly it entails. In view of this, the first aim of this thesis is to conceptualise and operationalise competence-based education to give researchers and practitioners a deep understanding of what defines competence-based education. The second aim of this thesis is to investigate competence-based education, with the help of the model that resulted from the first aim and described the underpinning characteristics of competence-based education. This has the aim to investigate how competence-based education manifests itself in educational practice. These aims led to a set of interrelated research questions, as presented below. The first and second research question relate to the first aim. The three other research questions relate to the second aim. The research questions are accompanied by a description of the manner in which they are answered. Each research question is addressed in a separate chapter of this thesis.

As mentioned above, the concept of competence-based education has been conceptualised and operationalised only to a limited extent; although definitions are available, they differ widely and most of the definitions have been formulated from a theoretical rather than an empirical position (Van den Berg and De Bruijn, 2009). This accounts for the first research question of this thesis, which reads as follows: 1. *What are the defining characteristics that should be adopted in a curriculum that aims to develop students' competencies (as seen from the perspective of the holistic conceptualisation of competence)?* This research question is addressed in chapter 2. An extensive literature review led to the development of a preliminary model consisting of ten principles defining competence-based education. This is the conceptualisation of competence-based education. These ten principles are operationalised by means of variables and these, in turn, are used to define realisation stages for each principle. This should be seen as the operationalisation of competence-based education. By means of a focus group session and a Delphi study, in which leading Dutch researchers participated, this preliminary model has been further developed and validated.

All following studies make use of the theoretical model developed in the first chapter, to study various aspects of competence-based education. As such, these studies give insight into competence-based education in educational practice, as well as validate the theoretical model for educational practice.

Developing competence-based learning environments is a complex task. Moreover, a great deal of discussion is going about the pros and cons of competence-based education. In this field of conflicting forces teachers have to develop competence-based education, all the while carrying out their regular duties. In view of this, two research questions are answered in chapter 3: 2a. *Are teachers and developers, who are redesigning their curricula towards competence-based curricula, able to work with a model that synthesises all the defining characteristics of competence-based education?* 2b. *To what extent do they think that working with such a model is useful?* By means of observing and interviewing teachers, the comprehensiveness and utility of the model containing a synthesised set of characteristics of competence-based education, as designed in the preceding chapter, is studied. The model has been used as a tool to assist teachers in evaluating their own study programmes. With teachers operating in 12 teams, it was investigated whether the teams were able to evaluate their own study programmes and whether they were able to make decisions about what their study programmes should look like in the near future.

Owing to the lack of a consensus definition of competence-based education, the activities that are undertaken in educational practice under the umbrella of competence-based education differ in the extent to which they may rightly be termed 'competence-based'. A clear operationalisation of competence-based education should make it possible to investigate curricula-in-action and compare the various perceptions of them held by the students and teachers engaged in them. Accordingly, in chapter 4 the following research question is answered: 3. *To what extent is it possible to use a model that synthesises all the defining characteristics of competence-based education to investigate curricula-in-action that purport to be competence-based?* The aim of this study is to investigate the extent to which curricula-in-action show characteristics of competence-based education, according to students and teachers. For this research a quantitative research method was applied. Students and teachers were asked to complete a questionnaire that was developed with the help of the variables that were defined to operationalise competence-based education. The results of teachers and students from the same study programme were compared to see how their perceptions differed. To gain greater insight in students' perception some additional analyses were done. The student questionnaire was completed twice, with four to six months between. This made it possible to compare the scores in order to analyse the extent to which students perceive competence-based characteristics as consistent aspects in their curriculum. Finally, an inventory was made of the learning style characteristics of students. An analysis was made of the extent to which students with differences in their learning style characteristics showed differences in their perception of competence-based education.

Educational institutions that are involved in implementing competence-based education are engaged in a radical educational reform, one that has substantial implications for teachers (Seezink, 2009). The consequences for teachers of this transformation to competence-based education are investigated in this thesis. The set of defining characteristics of competence-based education is used to gain an overview of these consequences. Since it can be assumed that realising competence-based education requires different activities and

qualities of teachers than does traditional education, the following research question has been formulated: 4. *What roles and corresponding tasks can be identified for teachers who aim to realise competence-based curricula?* In chapter 5 this research question is answered. By means of a literature and document study the roles and corresponding tasks of teachers in competence-based education are identified. Whether and the extent to which teachers considered the identified roles of teachers in competence-based education to be important was studied. This was achieved by means of a questionnaire and confirmatory factor analysis.

One of the main aims of competence-based education is to prepare future professionals so that they are able to perform properly and without too many teething problems in their future jobs and as participants in society as a whole. In order to realise this aim, the demand to incorporate learning in professional practice within educational curricula is increasing. To benefit fully from the presupposed advantages of learning in professional practice, and to solve the problems that have existed for decades in regard of learning in practice, the optimisation of the connectivity between learning in school and learning in practice is crucial. The final research question of this thesis reads, therefore, as follows: 5. *Do the defining characteristics of competence-based education provide footholds to improve the connectivity between learning in educational institutions and learning in the workplace?* This study first analysed which defining characteristics of competence-based education are related to connectivity between learning in educational institutions and learning in the workplace. This selection is used to analyse connectivity thoroughly. Three stakeholder groups (students, teachers and workplace trainers) involved in two study programmes in one front-runner MBO institution were questioned by means of group interviews about how they experienced the connectivity between learning in educational institutions and learning in the workplace in competence-based education. The group interviews aimed to reveal the difficulties of realising connectivity between learning in educational settings and learning in the workplace.

Finally, in the last chapter of this thesis the main conclusions are described and discussed. The last chapter opens with a summary of the main findings. This gives rise to a general discussion about the different levels of integration of competence-based education. To conclude, various matters are addressed, namely, some of the limitations of this PhD research, the challenges for further research, the practical implications for educational practice and the state of affair of competence-based education in the Netherlands.

The relevance of this thesis lies in its conceptualisation and operationalisation of the concept of competence-based education. Both of these are used to analyse, support and improve the developments towards competence-based education that are underway in vocational education. The model that synthesises the defining characteristics of competence-based education offers possibilities for investigating how competence-based education manifests itself in educational practice. A diverse set of research methods and instruments is used to discover what competence-based education means in theory and practice. Its successful implementation ensures that in time competence-based education does achieve its pre-determined goals. The findings of this thesis are necessary to any effort to ascertain the success of competence-based education with regard to its goals.

Chapter 2

Comprehensive competence-based vocational education[1]

In this study, by means of studying various theoretical perspectives, a focus group session and a Delphi study, a model is developed that summarises the underpinning characteristics of competence-based education. The model delineates competence-based education by means of eight principles, each of which is accompanied by various variables. The variables make it possible to divide each principle into four stages of realisation. This resulted in a matrix of thirty-two cells. The principles entail both instruction and content aspects. The model is based on models for total quality management and it can enable teachers and developers to realise the transition from more traditional education towards competence-based education.

[1] This chapter is based on Wesselink, R., Biemans, H. J. A., Mulder, M., & Van den Elsen, E. R. (2007). Competence-based VET as seen by Dutch researchers. *European Journal of Vocational Training, 40*(1), 38-51.

Chapter 2

Introduction

Despite discussions about the usefulness of competence-based education (Korthagen, 2004; Tillema, 2004) or identified pitfalls of competence-based education (Biemans et al., 2004), competence-based education remains a popular concept. Various authors made a start with defining competence-based education (Kouwenhoven, 2003; Klarus, 2004; Mulder, 2004; Onstenk, De Bruijn and Van den Berg, 2004), but there is still a need for a thorough study that conceptualises and operationalises competence-based education that also can support practitioners. Research question that is central in this chapter therefore is: *What are the defining characteristics that should be adopted in a curriculum that aims to develop students' competencies (as seen from the perspective of the holistic conceptualisation of competence)?* This chapter first presents an overview of the theoretical perspectives that were used to conceptualise competence-based education, followed by a description of the methods and finally the results and conclusions will be presented.

Theoretical perspectives

To establish a first idea of competence-based education a set of various theoretical perspectives were consulted. Social-constructivism, human resource development, workplace learning and curriculum development are examples. One of the theoretical notions that is used as a starting point to establish a model of competence-based education is social constructivism (Harris and Alexander, 1998). Constructivism arose from dissatisfaction with the theories of knowledge in the tradition of Western philosophy. The central assumption in constructivism is that knowledge and skills are not products that can be transferred from one person to another. Knowledge and skills are results of learning activities of learners (Glaser, 1991). Constructivism knows different approaches; from a radical individualistic approach to a more social constructivist approach. The social constructivist approach in particular influences thoughts about competence-based education. In a more (social) constructivist view of learning individuals construct their own truth and knowledge by interacting with others (Simons, 2000). Knowledge construction mostly takes place in a social setting; so a group of persons construct their own truth or social reality. Therefore learning should no longer be seen as a stimulus-response phenomenon. Learning requires self-regulation and the building of conceptual structures through reflection and abstraction (Von Glasersfeld, 1995).

Besides social-constructivism, other theoretical insights contributed to defining the concept of competence-based education. The most important ones are described in the following section ending up in a first set of 10 principles important for competence-based education (Mulder, 2004), which was the starting point for the focus group meeting and the Delphi study.

As described in the first chapter of this thesis, the experiences in the USA with competencies as a starting point for curricula did not become a success because of the detailed character of competencies; there was an increasing demand to use meaningful units as a starting point for developing curricula. This resulted in more interest in vocational core

problems, job competence profiles and job pictures which brought about principle 1: 'Verify in which jobs and roles students end up after completing their studies and determine which competencies are critical in those jobs and roles'. Fragmentation in education has a distinct influence on curricula. It leads to demand for curriculum integration (Tanner and Tanner, 1995) and fewer pure disciplinary approaches. It was believed that theory and practice should be more aligned with each other and that parts of professional practice should be used as the focus in curriculum planning. This brought about principle 2: 'Identify vocational core problems which lead to curriculum development'.

McClelland (1998) argues that competence development should be organised by transparent and criterion-based assessments and should be measured before, during and after the learning trajectory. These insights resulted in two principles: principle 3 'Rewarding competence developments should be done through assessment by different assessors'. And principle 4 concentrates on the following: 'Before the learning trajectory starts, the competencies already developed have to be assessed'.

Essential characteristics of the holistic conceptualisation of competence are the integration of knowledge, skills, and attitudes and the inevitable relationship with practical contexts. In learning trajectories and assessments, integration of knowledge, skills and attitudes has to be realised to ensure that students are well enough equipped to carry out a practical assignment successfully. The relationship with practice is important, because having practical experiences enables students to make representations of practice (Eraut, 1994) and that makes them realise what practice entails. Therefore it is important for students to situate their learning experiences in practice. Critical reflection on the diversity of tasks and problem situations a student meets in practice (Schön, 1983) is essential for competence development. Critical reflection causes an expansion and deepening of learning experiences and these processes are necessary for competence development. These theoretical insights resulted in three more principles. Principle 5 states the following: 'Learning has to be situated in recognisable and meaningful contexts.' Principle 6 states: 'Connecting theory and practice is necessary. Let students acquire experiences and let them reflect on these experiences.' Principle 7 is as follows: 'Knowledge, skills and attitudes should be integrated into learning trajectories, including assessments.'

During the design of learning trajectories for competence development it is important to support the learning processes of students and, depending on their progress, to increase their autonomy (Van Merriënboer, 1997). To give students full opportunity to realise competence development, tailor-made, attractive and inspiring learning environments in which all their learning needs can be fulfilled are necessary. This led to principle 8: 'Make it possible for students to be both increasingly responsible for their own learning processes and to steer their own learning processes.' In these learning environments based on competencies, students are parts of a community of practice (Wenger, 1998). Students are seen as junior colleagues instead of students or trainees. Teachers are both coaches and experts taking part in the knowledge construction of students through respectful dialogues. These theoretical notifications led to principle 9: 'Teachers have to be stimulated to fulfil their role as coaches'.

Competence development can be realised for each individual through personal development plans and portfolios in which competence development can be recorded. According to Onstenk (1997) it is important to pay attention not just to competencies important for performing a job; competencies in communication or learning are also important for surviving in today's society. Competence-based curricula have to prepare students for lifelong learning. This concept led to the final principle, principle 10: 'In a curriculum a basis must be formed to develop competencies for the future career, with specific attention on learning to learn competencies.

The set of principles, which are the conceptualisation of competence-based education, was transposed into a model. The idea behind a model and not just a set of principles, is that a model not just describes (or prescribes) what should be seen as competence-based education by means of underpinning principles, but that a model gives footholds to start working from a situation in which traditional education is dominant, towards a situation in which competencies are used as dominant starting points for curriculum development. Inspired by quality improvement models (i.e. TQM, INK), which are used to improve quality at organisational level by means of proper management, the choice was made to establish stages of realisation of competence-based education as a means to operationalise competence-based education. Research findings suggest that applying TQM-like models generate competitive advantage, not because of features such as quality training, process improvement, or benchmarking, but tacit features that are difficult to imitate such as an open culture, employee empowerment, and executive commitment (Powell, 1995). Stages of quality improvement, as mentioned in various TQM-models were used as an example and translated in stages of realisation of competence-based education. Therefore, each principle is described by means of variables and these variables are the basis for describing four stages of realisation. Adding variables (i.e. indicators) in the model, adds to the utility in practice, and the transparency and understanding of what high-quality competence-based education should look like and work like in practice.

The four stages in the model can be characterised as follows: 'not competence based', 'starting to be competence based', 'partially competence based' and 'completely competence based'. Not competence-based education can be defined as traditional education. Knowledge transfer is a central issue in this stage. The second stage can be defined as knowledge transfer as well, however this transfer is accompanied by examples or case studies from practice. The third stage, 'partial competence based', means that to some extent the disciplinary approach to education is replaced by an approach in which practice plays an important role. In the fourth and final stage, education is completely designed based on competencies and vocational core problems.

The theoretical perspectives mentioned above pay attention to separate aspects of competence-based education. However, it remains a collection of different theoretical notions and there is no consensus on a model for competence-based education. In the following part, a process is described on how to come to a model of competence-based education.

Method

The starting point for the empirical research activities undertaken in this study was the list of ten principles including the stages of realisation of competence-based education as described in the former section. Besides the theoretical part to come to these principles, the method contains a focus group session and a Delphi study. In the following sections the participants and the instruments used will be described.

Participants

Some 30 experts were asked if they were able and willing to participate in the focus groups and subsequently the Delphi study. They were selected according to their (research) expertise in vocational and/or competence-based education and articles published. A group of 15 experts reacted positively. Almost all of the other 15 reacted positively and emphasised the need for this research, but were unable to attend, mainly because of time restrictions. The 15 that agreed to take part came from eight different (research) institutions in the Netherlands. All 15 participants joined the first focus group session and in the first round of the Delphi study 9 of 15 participants returned the questionnaire. In the second round of the Delphi study, 7 of the 15 participants returned the questionnaire.

Instruments

This study includes both a focus group and a Delphi study. A focus group session is one in which participants discuss a specific topic, aiming at reaching common understanding and a shared picture of it in a relatively short period of time. A Delphi study seeks to get an accurate shared result through a set of sequential questionnaires interspersed with summarised information and feedback from opinions derived from earlier responses (Delbecq, Van der Ven and Gustafson, 1975).

The study consisted of three rounds. The first round was the focus group session, during which the first set of ten principles was discussed and the results were processed in the model. Then the Delphi study took place. Participants were asked to complete questionnaires and in these questionnaires they had to mark to what extent they agreed with the changed principles, variables and stages. They could score from 1 'I fully agree' to 5 'I do not agree at all' and they also could include comments. In the first questionnaire of the Delphi study, participants could respond to each aspect of the principles (i.e. principle, variables and stages), both with scores and comments. In the second, while it was decided to still give respondents the opportunity to respond with a mark for each aspect, they could only comment on the principle as a whole (principle including the variables and four stages of realisation). This choice was made to get a better idea of the principles as a whole, because in the first questionnaire some respondents' comments were inconsistent. Participants' scores and comments were processed. The scores were mainly used to see the overall opinion on a principle and its application. When a principle had a mean score between '1' and '2' hardly any changes were considered. For mean scores between '2' and '3' a change was thoroughly considered. For scores higher than '3' changes were almost always made. The comments were

used to improve the content of the principles. For the final decision on improvements, three researchers always had to agree on the proposed changes. The Delphi study was finished when the overall score of each principle was satisfactory (mean score between '1' and '2') and participants had no further modification suggestions.

Results

Table 2.1 summarises the mean scores, standard errors and number of respondents on the different principles of the conceptual framework from the first and the second rounds of the Delphi study. The final principles and accompanying applications are used in the table. The results in Table 1 show in the first round 11 of the 21 items (three items per principle) scored between '2' ('I agree to a large extent') and '3' ('I do not have an opinion'). After deliberation, these items have been changed. For the 10 items that scored lower than '2' hardly any changes were made. In the second round of the Delphi study only two items scored '2' or higher. This means that participants 'fully agree' or 'agree to a large extent' with almost all the items in the framework. Except for the items in principle 7, all items scored higher than '2'. Based on comments some minor changes were made. The second round scores were generally lower (i.e. more agreement) than in the first round. Table 2.1 also shows that for some principles not all respondents reacted because they did not consider themselves experts in that particular field.

Table 2.1 Mean scores from the first and second round of the Delphi study, Standard Errors (SE) and number of participants (n); 1 = 'I fully agree' and 5 = 'I do not agree at all'

	Results round 1			Results round 2		
Principles	Mean	SE	n	Mean	SE	n
1. The competencies on which the programme is based are defined.	1.56	0.53	9	1.43	0.54	7
Content of variables	1.78	0.44	9	1.86	0.69	7
Content of stages 1 to 4	2.00	1.00	9	1.86	0.69	7
2. Vocational core problems are the organising unit for (re)designing the curriculum (learning and assessment).	1.67	0.50	9	1.29	0.49	7
Content of variables	1.83	0.61	9	1.71	0.76	7
Content of stages 1 to 4	2.11	0.60	9	1.71	0.76	7
3. The competence development of students is assessed before, during and after the learning process.	2.56	1.13	9	1.00	0.00	6
Content of variables	2.22	0.97	9	1.67	0.82	6
Content of stages 1 to 4	2.78	1.20	9	1.86	0.69	7
4. Learning activities take place in a range of authentic situations.	1.67	1.00	9	1.29	0.49	7
Content of variables	1.89	1.05	9	1.43	0.54	7
Content of stages 1 to 4	2.22	1.39	9	1.86	0.90	7

5. In learning and assessment processes, knowledge, skills and attitudes are integrated.*				1.14	0.38	7
Content of variables				1.29	0.49	7
Content of stages 1 to 4				1.86	0.69	7
6. Self-responsibility and self-reflection/reflection are encouraged in students.	1.87	0.35	8	1.29	0.49	7
Content of variables	2.33	0.87	9	1.57	0.54	7
Content of stages 1 to 4	2.13	0.84	8	1.86	0.69	7
7. Teachers both at school and practice fulfil their roles as coaches and experts equally.	1.89	0.60	9	1.71	0.95	7
Content of variables	2.38	1.06	8	2.29	0.95	7
Content of stages 1 to 4	2.63	1.06	8	2.00	1.00	7
8. A basis for students to achieve an attitude of lifelong learning is realised.	1.61	0.60	9	1.14	0.38	7
Content of variables	2.14	1.07	7	1.43	0.79	7
Content of stages 1 to 4	1.40	0.55	5	1.43	0.79	7

* Principle 5 is added after the first round of the Delphi study.

It was decided that this Delphi study was concluded when a predefined percentage of 75% of participants agreed with the principles and their application. In this study 75% of participants had to 'fully agree' or 'agree to a large extent'. In the second and last round of the Delphi study for each aspect, five or six of the seven respondents 'fully agreed' or 'agreed to a large extent' with the items of the framework. Consequently, one can conclude that respondents came to a consensus on the model. Table 2.2 shows the final results.

	Principles	Variables	Stages of realisation			
			Not competence based	Starting to be competence based	Partially competence based	Completely competence based
Principle 1	The competencies on which the programme is based are defined.	- Construction of a competence profile - Usage of the competenc profile	There is no job competence profile put together.	There is a job competence profile without participation of the vocational practice. This (vocational) competence profile has been used during the (re)design of the curriculum.	There is a job competence profile with participation of the vocational practice and this profile is fixed for a longer period of time. This job competence profile has been used during the (re)design of the curriculum.	There is a job competence profile with participation of the vocational practice and this profile is tuned frequently with the regional and local vocational practice including the major trends. This job competence profile has been used during the (re)design of the curriculum.
Principle 2	Vocational core problems are the organising unit for (re)designing the curriculum (learning and assessment).	- Role of vocational core problems in development of curricula - Role of vocational core problems in assessment	There are no vocational core problems specified.	There are vocational core problems specified, which are used as examples in the (re)designing of the curriculum.	There are vocational core problems specified. These core problems are the basis for the (re)design of some parts of the curriculum.	There are vocational core problems specified and these lead to the (re)design of the whole curriculum.

	Principles	Variables	Stages of realisation			
			Not competence based	Starting to be competence based	Partially competence based	Completely competence based
Principle 3	The competence development of students is assessed before, during and after the learning process.	- Assessment of prior competencies - Formal rewarding - Provision of feedback - Flexibility in moment and way of assessing	Assessment is the final stage of a learning process and takes place at a fixed moment.	Assessment takes place at several moments. Assessment is used for formal assessment and does not play a role in the learning process of students.	Assessment takes place before, during and after the learning process. Assessment is used for both formal assessment and competence development of students.	Assessment takes place before, during and after the learning process. Assessment is used both for formal assessment and competence development of students. Students determine the moment and format of assessment themselves.
Principle 4	Learning activities take place in a range of authentic situations.	- Authenticity - Variation - Connection between learning in school and learning in practice	Learning in practice is of subordinate importance and there is no relation with learning at school.	Learning at school is in the lead. In some cases a relation is set up with learning in practice or experiences from practice.	Learning activities take place in authentic situatons to a large extent, but the relationship with learning in school is insufficient.	Learning activities take place in diverse authentic situations to a large extent and they are clearly related to the learning activities in schools.

	Principles	Variables	Stages of realisation			
			Not competence based	Starting to be competence based	Partially competence based	Completely competence based
Principle 5	In learning and assessment processes, knowledge, skills and attitudes are integrated.	- Integration of knowledge, skills and attitudes	Knowledge, skills and attitudes are separately developed and acknowledged.	Knowledge, skills and attitudes are sometimes integrated in the learning process. Knowledge, skills and attitudes are assessed separately.	Knowledge, skills and attitudes are integrated in the learning process or in the assessment procedure, not in both processes at the same time.	Integration of knowledge, skills and attitudes is for both learning and assessment processes the starting point and therefore applied.
Principle 6	Self-responsibility and self-reflection/reflection is encouraged in students.	- Self-responsibility - Self-reflection - Students' learning questions	Learning activities are characterised by external steering: students carry out assignments by means of elaborated instructions. There is no (self-)reflection.	In a part of the learning activities, students determine the way of learning themselves. There is hardly any reflection on the learning process and functioning in vocational settings.	Students themselves determine their way of learning, and time and place of learning, based on reflection on the learning process and functioning in vocational settings.	Students are after all responsible for their own learning processes based on their own learning needs.

	Principles	Variables	Stages of realisation			
			Not competence based	Starting to be competence based	Partially competence based	Completely competence based
Principle 7	Teachers both at school and practice fulfil their roles as coaches and experts equally.	- Coaching on the learning process - Coaching on the content	There is no support. Knowledge transfer is central to the learning process.	To a limited extent students are responsible for the learning processes. Teachers support through guidance.	Students enjoy a certain level of autonomy in determining their own ways of learning. Teachers observe when students need support and offer it.	Teachers stimulate students to formulate learning needs and based on self-reflection determine their own learning process and need for support of teachers.
Principle 8	A basis for students to achieve an attitude of lifelong learning is realised.	- Development of professional identity - Development of learning competencies	There is no attention paid on competencies that are related to learning or (labour) identity development.	In the curriculum there is attention paid on competencies that are related to learning and (labour) identity, but these competencies are not integrated in the curriculum.	During learning trajectories competencies related to learning and (labour) identity development are clearly related to vocational core problems and attention is paid on those competencies to a large extent.	During learning trajectories competencies related to learning and (labour) identity development are integrated and reflection on the future careers of students has taken place.

Table 2.2 Model for competence-based vocational education

The result of the focus group session and Delphi study is the model as shown in Textbox 2.1. The study started with a list of 10 principles; the renewed list consists of eight principles. Some major changes have been made to the first set of 10 principles. The adjustments that were made at stage level, were consequences of the changes in principles. First, in the former set of principles 'assessment' and 'accreditation of earlier developed competencies' were separate principles. Because these principles are both closely related to assessment, they are combined as one principle in the renewed set of principles. Second, in the former set two principles related to learning in (authentic) contexts and the relation between learning in school and in contexts. In the new set the connectivity between learning in school and learning in practice is identified as a variable of learning in various authentic situations. Third, the role of students has changed. In the former set of principles self-steering of students was mentioned. In the renewed set, self-steering is changed to (self-)reflection, because (self-) reflection is a better indicator of the (complex) role of the student. Fourth, in the first set of principles the role of the teacher was described as only being a coach. During this study it appeared that the teacher is not only a coach, but still remains an expert. Besides, in the former set of principles only the role of the teacher (in the institutions) was mentioned. In the new set of principles the workplace trainer or coach in practice is also included, because of the increasing importance of this role. Finally, in the first set of principles no attention was paid to developing the (professional) identity of students. However, in this study the importance of developing (professional) identity is emphasised; identity development for individuals in today's society as well as for individual employees is included in the last principle.

Principle 5 needs some additional explanation. In the first set the principle concerning the integration of knowledge, skills and attitudes was included. However, in the focus group discussion this principle was deleted from the preliminary set because the integration of knowledge, skills and attitudes was taken to be a self-evident characteristic of competence. But, in the first round of the Delphi the self-evident integrated character of competencies appeared to be less clear cut; several comments emphasised the importance of the integration and therefore the principle about integration of knowledge, skills and attitude was re-introduced.

Conclusion and discussion

The main objective of this study was to define characteristics which should be adopted in a curriculum that aims to develop students' competencies (as seen from the holistic conceptualisation of competence). By means of developing a model of competence-based education including principles to conceptualise competence-based education and stages of realisation to operationalise competence-based education this objective was reached. To see the added value of such a model in practice, a first attempt of using the model in practice was conducted. The model was used in three institutions; two MBO and one HBO. The three institutions developed and implemented competence-based education separately from one another. In a consultation with a representative group of persons (three to five) from each institution, each curriculum, was analysed and discussed with the help of the model. The

following preliminary results of all three cases can be given. First, the representatives recognised their situations in the model and determined in which stage of realisation of competence-based learning their curriculum was situated. Second, the representatives could identify which aspects of the current situation should be improved. Finally, the model made it possible to formulate a concrete plan for future developments. Although preliminary, the conclusion can be drawn that this model can support teams of teachers in MBO and HBO institutions in their development towards competence-based education. Further research with these and other programme teams of MBO and HBO institutions needs to explain the exact added value of the model for educational practice. This more extensive study will be conducted and described in the next chapter.

Competence-based education is a catch-all term comprising many different forms of education (Van der Klink, Boon and Schlusmans, 2007). However, studies that look at all relevant aspects of competence-based education are scarce (De Bruijn, Overmaat, Glaudé, Heemskerk, Leemand, Roeleveld and Van de Venne, 2005). Several studies focus specifically on the content of competence-based curricula, such as on critical thinking competence for citizenship (Ten Dam and Volman, 2004), problem-solving competence for eighth-graders (Perels, Gűrtler and Schmitz, 2005), and in-service competence for teachers (Brouwer and Korthagen, 2005). There are also examples of scholars who study instructional aspects of competence-based education. Perels, Gűrtler and Schmitz (2005), for example, conclude in their research that the combination of self-regulatory and problem-solving strategies is most effective in terms of improvement of self-regulatory competencies. Studies on authentic assessments demonstrate that when students perceive an assessment as resembling their future professional practice (i.e. as authentic), they are stimulated to study more intensively and they develop more generic competencies (Gulikers, 2006). Finally, electronic learning environments can stimulate competence development; students are enabled to work together and the teachers are capable of acting as coaches because they can closely follow the learning process of the students (Bastiaens and Martens, 2003). Each of these studies covers a particular aspect of how competence development can be fostered.

According to the model as resulted from this study both the '*what*' (curriculum) and '*how*' (instruction) questions appear to be relevant for realising competence-based education. The first question is *what* competencies are necessary to function in a job or in society (content of the curriculum) and the second question is *how* should these competencies be fostered (instruction). The principles labelled 1, 2, 5 and 8 in the model focus specifically on the content of a study programme, while the remaining four principles focus specifically on the instructional features. As such, many of the principles (referring to rather general teaching and learning approaches) are not unique to competence-based education (e.g. principle 6 on stimulating self-responsibility and self-reflection). At this point, it should be noted that it is the combination of the principles that defines competence-based education and that makes that it is labelled as comprehensive. By adding the adjective comprehensive it is shown that the principles have to be dealt with in a comprehensive manner; that means all principles are

needed and relevant to be developed to realise completely competence-based education eventually.

The model of comprehensive competence-based education (CCBE) concerns the curricula and didactics in institutions for vocational education. It describes principles and items that can be applied at curriculum level. The model does not include anything about competence-based education at the institutional level. However, when realising competence-based education, the whole institution has to change. Further research has to make clear what implementing competence-based learning means for institutions. Mulder (2003) has already indicated that although competence-based education is a promising development, it is rather complex and needs all developers' collective intelligence to make it a success.

As described in the beginning of the chapter, the ideas for competence-based education were was also based on the ideas of social-constructivism. And therefore it is not remarkable that the principles of the model of comprehensive competence-based education show resemblance to the most important features of constructivism. Loyens and Gijbels (2008) define constructivist learning environments as those characterised by knowledge construction, cooperative learning, self-regulated learning and working with meaningful, authentic problems. Because of these resemblances, comprehensive competence-based learning environments can be seen as examples of constructivist learning environments.

Chapter 3

Using the model of comprehensive competence-based vocational education to analyse competence-based curricula; experiences of teachers[2]

This chapter presents the results of a study designed to determine the extent to which the model of CCBE is understood and perceived as useful by teachers and developers for facilitating the process of developing competence-based education. The target group was MBO teachers and developers who used the model of CCBE to analyse the extent to which the study programmes they are responsible for could be characterised as competence based. The study included twelve teams of teachers and developers in the process of designing or redesigning their curricula to be more competence based. Teams used the model of CCBE to analyse their own curriculum. Data was collected by means of observation of these discussions and structured group interview after the discussions. The analysis of the quantified data showed that some parts of the model of CCBE need adjustment. Nevertheless, the model was considered to be both useable and useful. Teachers reported that the model helped them understand the state of affairs of their study programmes, and empowered them to make adequate decisions about the extent to which they want to make these programmes more competence based in the future. Furthermore, the model helped the teachers set priorities for the near future.

[2] Wesselink, R., Dekker-Groen, A. M., Biemans H. J. A., & Mulder, M. (in press). Using an instrument to analyse competence-based study programmes: Experiences of teachers in Dutch vocational education and training. *Journal of Curriculum Studies*.

Introduction

The model of CCBE sketches the distinct features of competence-based education and can be applied on all levels of vocational education, i.e. pre-vocational secondary vocational education, senior secondary vocational education and universities of applied sciences. The model might be useful for both teachers and educational designers as an instrument that enables them to study the state of affairs of a study programme that is or will be developed towards competence-based education. Therefore, the aim of the current study was to see to what extent the model of CCBE can be a useable and useful instrument in the process of developing study programmes towards competence-based education. This evaluation study concentrated only on institutions for MBO. This article first presents some practical implications of competence-based education to see the size of the innovation that is taking place, followed by a description of the study methods and finally the results and conclusions.

Realising competence-based education

Realising competence-based education has several implications. Based on results of scientific research some of these implications are described to get an impression of what competence-based education entails in educational practice. Competence-based education is expected to place emphasis on the developmental side of learning in contrast to more traditional learning that focusses merely at knowledge deficits. Gonzáles and Wagenaar (2005) argue that focussing on competencies, as the outcomes of curricula, allows for flexibility and autonomy because only the competencies are determined and not the route to developing these competencies. The route should be determined on individual level; students should design their own curricula to develop certain competencies. At the same time, competencies provide a common language for school and practice to describe what a curriculum actually is aiming at. The social aspect of practice needs to be understood and aligned with the key concepts and practices that are guiding vocational education. All competencies that have to be developed should be socially sourced (Billett, 2003).

Another important implication of competence development is the need of integration of learning and work practices. Griffiths and Guile (2003) point out that if students must understand (and be able to handle) the limitations they encounter when working in practice, they must have the opportunity to experience different contexts in order to create new knowledge and to reflect on their experiences. Collin and Tynjälä (2003) state that the most fruitful models for competence development are the ones in which theory and practice alternate and in which they are connected with the help of unifying learning tasks. Ellström (1997) points out the importance of allowing the student a certain freedom with respect to task definition, the choice of methods/means for solving tasks and evaluating results. Allowing a certain level of freedom is beneficial to competence development. Finally, Attwell (1997) states that the new extended role for vocational education (and human resource development professionals) is in creating learning conditions, in structuring learning, in providing guidance and monitoring for learners, in planning learning objectives and activities

with an emphasis on the provision of situational learning, in encouraging learning by doing and in guiding and facilitating the process of reflection. For the best learning result it is recommended that students steer their own learning process and that the teachers coach the students. The above-mentioned implications of competence-based education show that realizing competence-based education is a complex process and that implementing competence-based education must be seen as a radical innovation.

The discussion about the effectiveness of competence-based education (see Biemans et al., 2004; Mulder, Weigel and Collins, 2007) is ongoing at both national and international levels. There are hardly any results available which systematically prove the effects of competence-based education in job performance in the longer term (Van den Berg and De Bruijn, 2009), because the stage of development of competence-based education makes it difficult to study the effects. Important criticism concerning the realisation of competence-based education has been voiced in England, France, Germany and the Netherlands and this can be summarised as follows: there is no shared definition of competence; realising a good competence-based assessment is rather complex if not impossible; and some practical problems have been experienced in implementing competence-based education in vocational education. Concerning the definition of competence, chapter 1 provides a description of problems concerning the definition of competence. The problems related to assessment stem in part from the difficulty of defining the ideal picture of assessment; an ideal assessment of competence must include the issue of transfer and requires therefore a number of environments (Westera, 2001) and assessors. However, in reality teachers have limited resources and time and therefore cannot provide the quality they would like to. Finally, implementation problems are encountered because the new way of providing competence-based education has to be developed and tested alongside the predominant, traditional system wherein teachers have to provide students with lectures. In the new system teachers work in multidisciplinary teams and in a more traditional system teachers work independently in their own disciplines. This duality in responsibilities can understandably cause several problems.

Developing competence-based education is a complex process and it is a development that is not without critiques. So, teachers have to be able to deal with the complexity and they have to be prepared to deal with the critiques. The model of CCBE might be able to support teachers in developing competence-based education, but first it has to be determined whether teachers can work with the model.

Research objectives

As mentioned before, the model of CCBE is largely the result of a focus group discussion and a Delphi study. According to the results of a first pilot study, the model can be useful for teachers in determining the extent to which their study programme can be characterised as competence based (i.e. which stage of the model it corresponds to). Furthermore, the model appeared to be useful for aligning the expectations of team members when it comes to the principles of CCBE that should be developed further or should be improved (Wesselink, Van

den Elsen, Biemans and Mulder, 2007). Apart from this first pilot study, the model of CCBE that synthesises all characteristics of competence-based education and that can be used as instrument to facilitate the development of competence-based curricula has not yet been tested in practice. Therefore the current study was initiated to answer two questions. a) *Are teachers and developers, who are redesigning their curricula towards competence-based curricula, able to work with a model that synthesises all defining characteristics of competence-based education?* b) *To what extent do they think that working with such a model is useful?*

The first research question has the aim to evaluate teachers' comprehension of the model. Comprehension was measured by analysing whether the teachers understood the content of the CCBE model and to what extent the teams of teachers were able to reach a consensus about their own programmes while working with the model. The second research question has the aim to evaluate teachers' perceptions about the usefulness of the model by asking them for example whether they will use it again in the future.

Method

In this study a combination of qualitative research methods was used to evaluate teachers' comprehension and perceptions of the usefulness of the CCBE model; observations and structured group interviews were used to collect data. The mix of qualitative methods was chosen because this is a first explorative study to evaluate what teachers think about the CCBE model.

Participants

The MBO institution chosen for this study started already more than five years ago with preparations for competence-based education and eventually developed a system of competence-based education activities which has been adopted by most of the other MBO institutions for life sciences in the Netherlands. This institution distinguishes itself further by the innovative way in which it designs study programmes. In its current study programmes teams of teachers are held responsible for the whole programme. This is in contrast to traditional programmes in which a teacher is responsible for teaching one discipline and, although there is some cooperation, they are not held collectively responsible. In competence-based study programmes competencies and vocational core problems are used as the starting points and the teachers are collectively responsible for enabling the students to solve these vocational core problems. Therefore, teams of teachers were approached to participate in this study. Twelve teams of teachers agreed to use the CCBE model to analyse their development process towards competence-based education. The teachers did not receive any training on how to work with the CCBE model.

The twelve teams of teachers (and developers) of this MBO institution that participated in this study are responsible for diverse programmes spread across various domains. Each team consisted of about four members. The group of participants (n=54) had the following characteristics: 75% of the teachers were aged between 40 and 59 years. Their general teaching experience varied, but almost 40% had zero to ten years of experience and

the majority (almost 55%) had more than 20 years of experience. Almost 50% of all the teachers had over two years of teaching experience in competence-based education.

Instruments

The teams were asked to analyse their study programme for which they were responsible with the help of the model of CCBE. For each principle of the CCBE model they had to define whether their curricular activities correspond to stage 1 ('not competence based'), 2 ('starting to be competence based'), 3 ('partially competence based'), or 4 ('completely competence based'). In addition, the teams were asked to determine, again for each principle, which stage they would like to reach with their study programme over the next five years.

Observation was chosen as the research method to discover the extent to which the model of CCBE is comprehensible. It was expected that through observations it would become clear to what extent the teams understood the content of the model and to what extent they reached consensus. Based on earlier experience of applying the CCBE model in a pilot study, an observation protocol was developed to standardise the observations. This protocol stipulated that the observer had to record general information about the teams (number of teachers, disciplines, etc.); whether or not consensus was reached with respect to each principle of the model; and whether this consensus was preceded by a discussion about a programme's current and future stage of realisation. Additionally, the observer had to determine whether the text of each principle and the description of the stages were in any way unclear. The results of the observations were registered per principle. The observer was an independent researcher and therefore not involved in discussions. Three observers participated in the study and were instructed in advance on how to use the protocol.

At the end of each team session the observer asked the team questions by means of structured group interview about the perceived usefulness of the CCBE model. In total four questions were asked: i) Does the CCBE model support the discussion about developing competence-based education?, ii) Does the CCBE model give a better overview of the state of affairs of the study programme?, iii) Will the model of CCBE be applied more often in the future?, and iv) Does the model provide support for determining future priorities? The results are summarised in the following section.

Results

Comprehension

The first results presented are about the clarity of the content of the model of CCBE. After each discussion about the current and future stage of realisation of a study programme in relation to a certain principle, the observer recorded whether the participants had found it difficult at any point to fully understand the models text. If they felt a word or concept was vague, the observer registered in which part of the model it was found (i.e. principle or stage). Table 3.1 shows how many teams reported vagueness in any part of the text.

Table 3.1 Number of teams that reported vagueness in a principle and/or stage of the CCBE model

CCBE principles / Indices vagueness	1. Competencies	2. Vocational core problems	3. Assessment	4. Authentic situations	5. Integration K, S and A	6. Students' self responsibility	7. Roles of coach and expert	8. Lifelong learning	Total
No vagueness at all	4	4	4	7	8	8	9	6	50
Vagueness with respect to a principle	2	2	1		1	2			8
Vagueness with respect to a stage	4	4	7	3	3	1	2	4	28
Missing values	2	2		2		1	1	2	10

In almost 50% of the observations no vagueness was reported. The confusion that was reported mostly had to do with the stages. Most of the teams felt that principles 4 to 8 (authentic situations, integration of K, S and A, students' self-responsibility, roles of coach and expert and lifelong learning) as well as the accompanying stages of these principles were comparatively clear. Only a few specific words led to some confusion. The principles 1 to 3 (competencies, vocational core problems and assessment) including the accompanying stages led to more questions.

The most important sources of confusion per principle were as follows. Principle 1 (competencies) is concerned in part with whether a job competence profile is constructed with input from the vocational practice and in the completely competence-based stage this profile is frequently synchronised with regional and local enterprises. Not all of the teams had a clear picture of what was meant by 'the vocational practice'. Moreover, it was not clear to some teams whether the contacts involved in synchronising the profiles had to be formal or informal. The meaning of 'organising unit' in principle 2 (vocational core problems) was not clear to one team. These teachers suggested that it should be changed into 'starting point'. Most reports of vagueness had to do with principle 3 (assessment) because the distinction between 'formal assessment' and 'development of the student' was not clear.

The other factor used to measure comprehension was the extent to which teams reached consensus on the stage their current study programme is in and up to which stage they wanted to develop their programme in the future. The observer registered whether consensus was reached and, if so, whether a discussion had taken place in order to reach consensus. Table 3.2 presents the number of teams that reached consensus per principle (with or without discussion) on their current situation (c) and their future situation (f).

Table 3.2 Number of teams per principle that reached consensus (for **c**urrent and **f**uture situations and with or without discussion)

CCBE principles / Indices consensus	1. Competencies		2. Vocational core problems		3. Assessment		4. Authentic situations		5. Integration K, S and A		6. Students' self responsibility		7. Roles of coach and expert		8. Lifelong learning		Total
	c	f	c	f	c	f	c	f	c	f	c	f	c	f	c	f	
Consensus without discussion	1	8	2	6	1	8	4	9	8	8	2	7	5	7	5	8	81
Consensus after discussion	9	3	6	4	9	2	5	2	1	1	8	4	4	5	4	1	78
No consensus	1		2		2	2	1		1	1	1	1	2		1	1	17
Missing values	1	1	2	2			2	1	2	2	1		1		2	2	16

Table 3.2 shows that about the same percentage of teams (40 to 43%) realised consensus with or without discussion. To realise consensus about the current situation more discussion was needed than to realise consensus about the future situation. The discussions were mainly about how to interpret each principle and accompanying stages and what that interpretation meant for their situation. Additionally, most teams realised consensus about their future situation without discussion, because both the principles and the stages were clear by then.

During the discussions the teams made several remarks. For example, in relation to competencies (principle 1) several teams stated that they consult representatives of local vocational practice merely in an informal way. They questioned whether formal consultation is necessary to achieve synchronicity. They also said that vocational core problems (principle 2) should be formulated by the students themselves to make them more realistic. The assessment discussion (principle 3) focussed on several topics: unfamiliarity with testing for the use of competence development, lack of diagnostic tests, and use of a portfolio and formal assessment. One team thought principles 2 and 4 are entangled because core problems (principle 2) have to be part of authentic situations (principle 4). Principle 5, about integration, raised questions such as 'What does integrated mean?' and 'Are knowledge tests not allowed anymore?'. Self-responsibility (part of principle 6) is linked with the role of the teacher (principle 7) in stimulating the students to ask learning questions, supporting them with reflection problems and helping them to identify the differences in and between groups. The teams confirmed principle 6; students should have a certain freedom to make choices. In relation to principle 7 (roles of coach and expert) some teams discussed the independence of students. Do teachers have to wait until students ask for coaching? Finally, some remarks underpinned the importance of still being an expert.

Per principle, one or two teams did not reach consensus. In these cases one or two members of these teams were working with different target groups (i.e. vocational training programme or day release programme). The study programmes were developed together and

therefore strongly intertwined; however, in practice the way they educate their students appeared to be different. The teachers could not reach consensus, not because they did not understand the model, but because they were talking about different target groups and different ways of educating their students. In case of some teams the result of the session was unclear because there was not enough information available for the observer to make a clear choice or the process was going too quickly to make a clear choice. Therefore they were registered as missing values.

Usefulness

Four questions were asked to indicate teachers' perception of the usefulness of the CCBE model. Four of the twelve teams did not have enough time for this step because the teachers had other obligations. The first question, whether working with this CCBE model supported the discussion about developing competence-based education, was answered positively by five of the eight teams. The remaining three teams were neutral. Most teams believed that the CCBE model provided the possibility to align individual perceptions of some key terms and therefore to have a more effective discussion. Furthermore the model helped structure the discussion. While a discussion about competence-based education normally looks at all aspects at once, the model makes it possible to focus on separate principles. The second question, whether the CCBE model gives the teams a better overview of the state of affairs of their study programmes in relation to competence-based education, was answered positively by six of the eight teams (two teams thought that they already had a good overview). These six teams indicated that they used the model as a reference model. Five out of eight teams responded positively to the third question (whether the teams will use this CCBE model more often in the future). Two of these teams plan to use it every year to monitor their progress, because their current situations do not yet meet up to their ambitions. The other three teams that answered positively could not predict how frequently they will use it in the future. Three of the eight teams did not expect to use the model again. One team explained that they thought using the model once was enough. The fourth question was whether the CCBE model could provide support for the determination of priorities in the future. All teams clearly saw opportunities for using the CCBE model for setting priorities for the future. It helped the teams become aware of different possibilities and they indicated that they can set priorities more deliberately now.

Conclusion and discussion

In the introduction two objectives were formulated for this study. The first objective was to evaluate teachers' comprehension of the CCBE model. The first question related to this objective was whether the participants in this study understood the content of the model. For several principles a single word or a concept led to confusion. Furthermore, the exact differences between the stages in the model were not always clear to everyone and consequently it took some time to understand the content and to see the exact differences. On the basis of these first results it can be concluded that some adjustments are advisable. For

example, the stages have to be made more distinguishable and words that are difficult to understand or can be interpreted in various ways should be replaced. The second question concerning this first objective was whether the participants reached consensus about their study programmes' current stage of realisation as defined by the CCBE model. In most cases a discussion was needed to achieve consensus and most of the time these discussions were about how to interpret the content of the CCBE model. Several teams felt that the step from stage 3 ('partially competence based) to 4 ('completely competence based') of some principles was too big. Although most discussions finally ended up in consensus, some parts of the model were not interpreted in the same way by all teams. Teams were able to reach consensus internally, but it is not clear to what extent the interpretations of the different teams are uniform.

To make this model useful beyond the team level, the possibility of interpreting some parts of the model not uniformly should be reduced to a minimum. Adjustments mentioned before could lead to less misinterpretation and maybe more comprehension. Although some words or parts of sentences were not immediately clear to the teachers, they were able to use the model in its intended way. They were able to have a clear discussion about their study programme and to gain insight into their ambitions for the future.

The second objective was to discern the usefulness of the CCBE model. From the results it can be concluded that the model can be applied to analyse competence-based programmes in particular situations. It provides a good overview of the extent to which a study programme can be characterised as competence based. The teams reported that the model provided added value, especially in setting deliberate and shared priorities for future development. Using the CCBE model empowers them to make clear choices and agreements for the (future) development of their study programme in relation to CCBE. The model for CCBE can thus be used as an instrument to develop and analyse competence-based education within teams.

The teams of teachers that used the model did not make any remarks that would suggest that the current combination of principles is inaccurate or difficult to understand. Furthermore they did not indicate that any principles were missing in the model. It can thus be concluded that the model as a whole works well, but that it needs minor adjustment within the identified principles and stages of realisation.

This study is based on the feedback of a small number of users, so more research at national and international levels is needed to determine the added value of the model - and perhaps more importantly to determine the added value of competence-based education. A first step is to adjust the model and use it again in educational contexts (Sturing, 2010). For the time being this article indicates that the model for competence-based education should be seen as a heuristic guideline that empowers teams of teachers to develop competence-based education according to the national competence-based qualification profiles in Dutch vocational education.

As pointed out in the introduction of this thesis, the concept of competence is used in many countries, but does not mean the same in all of them. This ambiguity offers teachers and

developers space to replace existing labels (e.g. knowledge and skills) with more contemporary labels, such as competence, while hardly changing anything in educational practice. This gives rise to the question of whether competence-based education is actually being realised and to what extent the practice in schools really is changing. For this reason, the CCBE model contains principles for both content of curriculum and instruction. Using the model gives practitioners insight into the content of the curriculum (competencies) but also the way the curriculum should be taught. It therefore makes teachers aware of the aspects of their teaching-learning process that have to change in order for their study programme to be characterised as competence based. To prepare themselves for these competence-based education practices, teachers should develop their own competencies in coaching and assessing students. Institutions for vocational education and the educational institutions that operate on national or even international level should realise that the current population of teachers enjoyed a different kind of education and, if they want competence-based education to become a success, the teachers involved will have to be properly trained.

Chapter 4

Competence-based education; teacher and student perceptions[3]

Evidence-based proof is strongly missing in many educational innovations, and in the case of competence-based education it is a precondition for further research on the impact of competence-based education on student learning and competence development. The aim of this study was therefore to gain insight into the extent to which competence-based education is actually taking place in MBO and HBO in the Netherlands. Students and teachers from MBO and HBO institutions in the midst of redesigning their curricula to be more competence based were asked by means of questionnaires to what extent they noticed the principles of the model of CCBE in their educational programmes. Based on the research results it can be concluded that competence-based education is indeed being implemented in the MBO and HBO institutions studied. Both teachers and students noticed the presence of CCBE principles, and there were few significant differences between the perceptions of the two groups of students: MBO students had a consistent picture of CCBE principles over time, while their colleagues from HBO had a decreasing perception of CCBE principles. Finally, no differences were found between groups of students with specific learning style characteristics with respect to their perceptions of competence-based education. This study reveals that the model of CCBE can be used to study competence-based education in practice.

[3] This chapter has been submitted as: Wesselink, R., Biemans, H. J. A., Mulder, M., & Gulikers, J. T. M. (submitted). Competence-based education; teacher and student perceptions of an innovation in Dutch post-secondary education.

Chapter 4

Introduction

Institutions in the Netherlands for MBO and HBO have already started to apply competence-based education. HBOs are motivated to redesign their study programmes according to the principles of CCBE because they are convinced that this can improve the quality of teaching-learning processes and students' results. For MBOs, a competence-based qualification framework is being implemented at national level (and will be obligatory by 2011) that is guiding the design of competence-based curricula.

Several studies have shown that teachers and students interpret learning environments in different ways (Samball and McDowell, 1998). Students' perceptions even tend to drive their learning (Lizzio and Wilson, 2004). It is therefore interesting to study their perceptions of competence-based education. Looking through the students' eyes can provide useful information about the nature and quality of learning processes (Elen and Lowyck, 1999; Entwistle and Tait, 1990), and in turn be useful in optimising competence-based curricula. The goal of this chapter is to describe the status of competence-based education as experienced by students and teachers in both MBO and HBO by means of the model of CCBE that synthesises all characteristics of competence-based education. Main research question therefore is: *To what extent is it possible to use a model that synthesises all the defining characteristics of competence-based education to investigate curricula-in-action that purport to be competence based?* This chapter does not intend to provide an objective 'state of affairs' of competence-based education in institutions in the Netherlands by means of studying documented or intended curricula, but to look at the actual implemented curricula (Goodlad, 1979) or curricula-in-action. Knowing what is going on is a precondition for further research on the effects of competence-based education on student learning and competence development. This kind of evidence-based proof is strongly missing in many educational innovations.

The following section discusses students' and teachers' perceptions of education and presents the specified research questions of this chapter. The research method and results are then described, and conclusions are formulated.

Perceptions

As described, competence-based education is a rather new development in MBO and HBO and accordingly there is hardly any research available that shows the quality of competence-based education in relation to the results of students in these institutions. To draw conclusions about the quality of teaching-learning processes within competence-based education, research suggests that it is necessary to include students' perceptions of education. It has been pointed out that not just the characteristics of the learning environment itself, but students' perceptions of it influence the nature and quality of teaching-learning processes (Entwistle and Tait, 1990). Learning environments like competence-based learning environments are deliberately created to evoke meaningful learning experiences, but students' perceptions of the meaningfulness of the learning environment determines the learning results, and therefore should be taken into account. Moreover, research over the last four decades has

indicated that the perceptions of both students and teachers can be important for optimising teaching-learning processes. Teachers' perceptions are important elements in the social and psychological dimensions of learning environments (Fraser, 1998). Research investigating both teachers' and students' perceptions is important, because divergence and convergence between student and teacher perceptions have proven to be useful variables in investigating teaching-learning processes and are interesting points to seize upon in the preparation of teachers and in staff development (Brekelmans and Wubbels, 1991). Based on these notions, the following sub questions are formulated: i) Do students and teachers in MBO and HBO perceive principles of CCBE in their curricula and which principles are perceived more than others?; and ii) Are there differences between the perceptions of students and teachers?

Most competence-based curricula are still under construction and therefore it would be interesting to have a look to what extent these curricula change over time. By means of measuring the perceptions of students more often, it could be determined to what extent the curricula are changing. Therefore, the third sub question is : iii) Do students' perceptions change over time?

Students in the same learning environment can differ in the way they perceive this environment or in how they experience the learning activities; and this might eventually lead to different learning results. Vermetten, Vermunt and Lodewijks (2002) make clear that students with certain learning strategies appreciate principles of the teaching-learning process that suit their own way of learning. Moreover, they tend to use the learning activities in ways that suit their own habits, ideas and learning preferences. Students' perceptions of a learning environment are a result of the interaction between the students' approach to learning and the learning environment itself (e.g. Luyten, Lowyck and Tuerlinckx, 2001; Könings, 2007; Entwistle and Tait, 1990; Vermunt, 1998). Students' approach to learning can be operationalised by their learning style, which in turn can be defined as regularly used combinations of learning activities, which refer to thinking activities that students employ to learn. Vermunt (1998) developed a self-reporting instrument to measure learning styles. The term 'learning style' encompasses a coherent whole of cognitive processing and regulation learning strategies, learning conceptions and learning motivations (Vermunt, 1998). These various elements are labelled as learning style characteristics. In competence-based education some learning style characteristics might suit better than others, because of the active role students are expected to play. The fourth sub question is therefore: iv) Do students with different learning style characteristics differ in their perceptions of principles of CCBE? The methods used to answer the research questions are described in the following section.

Method

Since implementation of competence-based education is still relatively new, it is not surprising that studies of competence-based education, which take into account all of the eight principles of the model of CCBE, are mostly either theoretical, developmental or explorative. To answer the research questions of this study, a more quantitative approach has been adopted. The CCBE model makes it possible to question teachers and students in a

standardised way about their perceptions of competence-based education, and this makes it possible to compare the results and draw conclusions about potential similarities and differences between their perceptions.

Participants

In 2006, HBO and MBO institutions in the agricultural sector in the Netherlands that were working on realising competence-based education were asked whether they were interested in participating in a research project whose aim would be to study the extent to which students and teachers noticed the principles of CCBE in their educational practice. Several institutions reacted positively; they expected added value from evaluating their implementation efforts. The institutions selected study programmes that were in the process of redesigning curricula towards a more competence-based approach. Although these teams of teachers were still redesigning their study programmes, they had already started to teach on the basis of the new approach. Nine study programmes were investigated; one at HBO level and eight at MBO level.

Participant characteristics

The average age of the HBO students was 20.8, and they were all in their first year of HBO. 57% of these students had successfully completed a secondary education programme (HAVO or VWO) before starting HBO; 35% had completed MBO; and 8% came from another HBO programme.

The average age of the MBO students was 17.4. About 5% were in the last year of their study - these students were following a programme that started to implement competence-based education in the last year of the study programme. The other 95% were in their first year, because their programmes started implementing competence-based education in the first year of study. 90% of the MBO students had successfully completed pre-vocational secondary vocational education (VMBO). The other 10% had a different background. As discussed below the students' perceptions were measured at two moments. 181 students (72 HBO and 109 MBO) participated in the first measurement, and 77 students (42 HBO and 35 MBO) participated in the second measurement.

In all, 20 teachers (9 HBO and 11 MBO) were asked to complete a questionnaire. The average age of the teachers was 44.5; 32% percent of them had 0-5 years of experience in education; 32% had 5-20 years of experience; and 36% had more than 20 years of experience in education. In contrast, 26% of the teachers had less than 1 year of experience with competence-based education; 30% had 1 to 2 years of experience; 30% had 2-4 years of experience and 14% had more than 4 years of experience. Experience contains both developing and delivering competence-based education.

Instruments

Inventory of perceived comprehensive competence-based education

To measure the students' perception of the principles of CCBE, an inventory of perceived CCBE (IPCCBE) was developed based on the CCBE model. The variables for each principle (Table 4.1) that were used to make clear distinctions between the four stages of realisation of competence-based education ('not competence based' to 'completely competence based'; see Wesselink et al., 2007) were used. For each variable a statement was formulated that covered the content of that specific variable and made it possible to measure the relevant perceptions of both students and teachers. This exercise resulted in 19 statements. These statements were included in a questionnaire that the students were asked to complete at two different moments.

Table 4.1 CCBE principles and variables representing the principles

CCBE principles		Variables
1	The competencies on which the programme is based are defined.	1a Construction of a competence profile 1b Usage of the competence profile
2	Vocational core problems are the organising unit for (re)designing the curriculum (learning and assessment).	2a Role of vocational core problems in development of curricula 2b Role of vocational core problems in assessment
3	The competence-development of students is assessed before, during and after the learning process.	3a Assessment of prior competencies* 3b Formal rewarding 3c Provision of feedback 3d Flexibility in moment and way of assessing
4	Learning activities take place in a range of authentic situations.	4a Authenticity* 4b Variation 4c Connection between learning in school and learning in practice
5	In learning and assessment processes, knowledge, skills and attitudes are integrated.	5a Integration of knowledge, skills and attitudes
6	Self-responsibility and self-reflection/reflection is encouraged in students.	6a Self-responsibility 6b Self-reflection 6c Students' learning questions*
7	Teachers both at school and practice fulfil their roles as coaches and experts equally.	7a Coaching on the learning process 7b Coaching on the content
8	A basis for students to achieve an attitude of lifelong learning is realised.	8a Development of professional identity 8b Development of learning competencies

Table 4.2 provides some examples (for the variables marked with a * in Table 4.1) from the student questionnaire. The statements for the teachers were similar, except that they were formulated from the teachers' perspective. The statements represented stage four (i.e. 'completely competence based'). Teachers and students were asked to rate every statement indicating the extent to which they perceived the presence of the CCBE principle in their programme. A five-point scale (1- 'I do not agree at all' to 5 - 'I fully agree') was used to measure the perceived presence of the principles.

Table 4.2 Examples of statements from IPCCBE

Variables	Questionnaire items
3a. Assessment of prior competencies	'An assessment of my prior competencies has been done preliminary to my learning process.'
4a. Authenticity	'The learning environment corresponds to my future work environment.'
6c. Students' learning questions	'I have used my own learning questions as starting points for my learning processes.'

Data collection with the IPCCBE started in the second half of the students' first (for some students last) year of participating in competence-based education. It was a conscious choice to start the research after half a year, because at that time students begin to feel accustomed to the new programmes. To investigate the extent to which the students' perceptions of competence-based education changed over time, a second measurement was made after another four to six months. The internal consistencies of the scores on all 19 items in the IPCCBE were satisfying (Cronbach's α's ranged from .78 for HBO to .93 for MBO). The internal consistencies for the separate principles were not satisfying, probably because of the small number of items per principle.

Learning style inventory

Vermunt (1998) developed a learning style inventory specifically for students in higher education and this instrument has been used by Slaats, Lodewijks and Van der Sanden (1999) to identify learning styles of students in MBO. The learning styles inventory of Slaats, Lodewijks and Van der Sanden (1999) was used to determine characteristics of the learning styles of the MBO and HBO students. This learning style inventory was developed specifically for students in vocational education and tested in the Dutch context and therefore applicable in this study. The questionnaire measures learning style characteristics of students by means of a five-point Likert scale. This inventory contains 62 questions resulting in four domains and each domain in turn contains two scales (mentioned between brackets): i) processing strategies (integration and surface processing), ii) regulation strategies (internal regulation and external regulation), iii) conceptions of learning (learning as building knowledge and learning as the intake of information), and iv) motivational orientations (intrinsic motivation and extrinsic motivation). In this study the scales were used and summarised as learning style

characteristics. For all scales the internal consistencies were satisfying (all Cronbach's α's were higher than .70).

Data analysis

To answer sub question i, data collected through the two measurements were analysed by means of one sample *t*-test. This was used to measure the extent to which the overall mean scores of MBO and HBO students and teachers differed from '3' and the extent to which the means scores per principle differed from '3', whereby '3' indicated that students and teachers neither agreed nor disagreed with the particular statement. To answer subquestion ii, the differences in means on principle level between teachers and students were analysed by means of an independent *t*-test. The Cronbach's α's on principle level were not satisfying, but because of development purposes (i.e. questionnaire construction, to offer footholds for improvement and indications for future research) of this study it was decided to include the differences between the perceptions at principle level.

To answer subquestions iii and iv, again the overall mean scores on all eight principles (or 19 items) were used. To answer subquestion iii students who completed the IPCCBE twice were selected; the stability in perception was thus measured within the same group of students. These differences were analysed by means of a dependent *t*-test. In all, 26 MBO and 34 HBO students completed the IPCCBE twice and were included in this analysis.

To analyse whether the learning style characteristics of students related to their perceptions of CCBE principles (subquestion iv), an analysis with the Pearson's correlation was performed, using the different scores on the learning style characteristics and the scores of the first IPCCBE measurement. For all analyses, a significance level of $p < .05$ was used (unless indicated otherwise).

Results

CCBE perceptions of students and teachers

The overall scores (mean of the scores of all eight principles) on the IPCCBE of MBO students was 3.43 (SE = .70) in the first measurement and 3.44 (SE = .69) in the second measurement. The scores in both measurements were significantly higher than 3 (first measurement t (108) = 6.36 and second measurement t (34) = 3.74), meaning that students noticed the combination of principles of CCBE explicitly to some extent. The various MBO study programmes (eight in total) did not show significantly different scores, so all MBO programmes could be analysed as one group. In the first measurement, MBO students perceived all separate principles of CCBE significantly higher than 3 with t (105) scores ranging from 4.01 to 5.64 for the eight principles. In the second measurement, MBO students perceived principle 6 (students' self responsibility; t (31) = 1.87) not significantly higher than 3, so this principle was not noticed explicitly, nor did they confirm its absence.

The overall score on the IPCCBE of HBO students was 3.11 (SE = .57) in the first measurement and 2.95 (SE = .45) in the second measurement, both not significantly different from '3', so HBO students in general neither explicitly noticed the combination of CCBE

principles nor confirmed the absence of its principles. In the first measurement, HBO students perceived principles 1 (competencies; *t* (67) = 3.19) and 5 (integration K, S and A; *t* (69) = 5.16) significantly higher than 3; so the HBO students perceived the principles 'competencies' and 'integration K, S, and A' to a certain extent. The other principles of CCBE were perceived to a lesser extent, however the scores were not significantly different from 3, so the students neither explicitly noticed nor confirmed the absence of these principles. In the second measurement, HBO students gave a significantly higher score than 3 to principles 5 (integration K, S and A; *t* (39) = 4.86) and 7 (roles of coach and expert; *t* (40) = 2.04), so these principles were perceived to a certain extent. The HBO students noted the absence of assessment (principle 3; *t* (35) = -4.00) and lifelong learning (principle 8; *t* (36) = -2.45), because they scored these principles significantly lower than 3. For the other principles the scores did not significantly differ from 3 so HBO students did not notice the principles 1, 2, 4, and 6 explicitly, nor did they confirm their absence.

The overall scores on the perception scale of the MBO teachers was 3.64 (SE = .79) and the overall score for HBO teachers was 3.50 (SE = .52), both significantly higher than 3 (MBO *t* (10) = 2.67; HBO *t* (8) = 2.87), so both the HBO teachers and MBO teachers noticed the combination of principles of CCBE to a certain extent in their teaching-learning processes. On the principle level, both MBO and HBO teachers perceived principle 2 (vocational core problems; MBO *t* (9) = 4.30; HBO *t* (8) = 4.88), principle 4 (authentic situations; MBO *t* (10) = 3.39; HBO *t* (7) = 2.44) and principle 5 (integration K, S and A; MBO *t* (10 = 4.40; HBO *t* (8) = 3.16) to a certain extent, as they scored these principles significantly higher than 3. Furthermore, the MBO teachers gave a score significantly higher than 3 to principle 7 (roles of coach and expert; *t* (10) = 2.42) and the HBO teachers gave a score significantly higher than 3 to principle 1 (competencies; *t* (8) = 3.40). Table 4.3 summarises the results.

Table 4.3 Means (standard errors) of students' and teachers' perceptions on the CCBE principles; moment 1 and 2 and overall scores (all 8 principles together); (1 = 'I do not agree at all' and 5 = 'I fully agree'); (Italics indicate a significantly different score than 3)

CCBE principles	Students MBO-1 (n=109)	Students HBO-1 (n=72)	Students MBO-2 (n=35)	Students HBO-2 (n=42)	Teachers MBO (n=11)	Teachers HBO (n=9)
1. Competencies	3.42 (.95)	3.33 (.84)	3.41 (.96)	3.08 (.80)	3.59 (1.02)	4.17 (1.03)
2. Vocational core problem	3.47 (.91)	2.84 (.91)	3.56 (.94)	3.07 (.81)	4.25 (.92)	3.89 (.55)
3. Assessment	3.46 (.84)	3.04 (.70)	3.34 (.74)	2.61 (.58)	3.50 (.63)	3.32 (.43)
4. Authentic situations	3.61 (.85)	3.14 (.66)	3.69 (.81)	2.98 (.70)	3.97 (.95)	3.75 (.87)
5. Integration K, S and A	3.51 (1.18)	3.54 (.88)	3.50 (1.03)	3.70 (.91)	4.36 (1.03)	4.11 (1.05)
6. Students' self responsibility	3.32 (.76)	3.13 (.71)	3.24 (.72)	3.06 (.59)	3.00 (.85)	2.48 (.81)

CCBE principles	Students MBO-1 (n=109)	Students HBO-1 (n=72)	Students MBO-2 (n=35)	Students HBO-2 (n=42)	Teachers MBO (n=11)	Teachers HBO (n=9)
7. Roles of coach and expert	3.35 (.98)	3.13 (.94)	3.50 (.85)	3.23 (.73)	3.86 (1.19)	3.56 (.85)
8. Lifelong learning	3.50 (.84)	3.03 (.71)	3.68 (.80)	2.75 (.63)	3.37 (.74)	3.13 (.69)
Overall mean	3.43 (.70)	3.11 (.57)	3.44 (.69)	2.95 (.45)	3.64 (.79)	3.50 (.52)

Differences between students and teachers

In comparing the scores of the students with those of the teachers at both HBO and MBO institutions, there is only one significant difference to report at principle level. HBO teachers perceived principle 2 (vocational core problems) more than HBO students did (t (77) = 3.40). However, looking at the overall mean scores in both HBO and MBO institutions, teachers reported a higher score even though this was not significant. This could point to a tendency for teachers to notice the CCBE principles more than students. However, one principle, related to self-responsibility, was perceived less by the teachers (of both MBO and HBO). This difference is not statistically significant, but interesting nonetheless.

Stability of perceptions of CCBE principles

Seventyseven students completed the IPCCBE twice, and the differences between these scores were analysed. The MBO students did not show a significant difference over time (t (15) = .184), so the extent to which they noticed CCBE principles in their teaching-learning processes did not change. The HBO students did show a significant difference between measurements one and two (t (33) = 2.43). In the first measurement, the HBO students reported that they noticed the combination of CCBE principles to a larger extent than they did in the second measurement about a half year later. The scores on IPCCBE in HBO were thus not stable.

Learning style characteristics

To analyse whether there are correlations between the perceptions of the students of CCBE principles and their learning style characteristics, the mean score on the IPCCBE from the first measurement was used. For MBO students, one significant correlation can be reported. There is a positive correlation between the characteristic 'internal regulation' and the overall score on the IPCCBE, r = .29, p (two-tailed) <.05. No such relationship was found for the HBO students, because there were no significant correlations between the overall mean and HBO students' learning style characteristics.

Conclusion and discussion

Based on the results of this study, it can be concluded that implementation of competence-based education especially in MBO and to a certain extent in HBO is in fact taking place. The theoretical model of CCBE is reflected in actual educational practice and that makes it possible to conclude that the model of CCBE makes it possible to investigate competence-

based curricula-in-action. Students as well as teachers recognised principles of CCBE in their teaching-learning processes. Competence-based education is thus not only part of the intended curricula in the form of regulations and agreements, but it is also an integral part of the implemented curricula. It can also be concluded that competence-based education is neither 'old wine in a new bottle', nor a form of window-dressing (Van der Klink and Boon, 2003). Of course it is difficult to completely dissuade critics, but the results of this study indicate that competence-based education is taken place in educational practices.

Concerning the first subquestion (Do students and teachers in MBO and HBO perceive principles of CCBE in their curricula and which principles are more perceived than others?), the conclusion can be drawn that both MBO and HBO students and both MBO and HBO teachers perceive the combination of principles in their curricula, although the extent differed per principle. Although not a specific research aim, it is interesting to note that MBO students, in general, perceived the principles of CCBE to a significantly larger extent than their HBO equivalents. This can be explained by the fact that the MBO institutions were obliged to make progress in developing competence-based education, because MBO institutions have to be finished with realising competence-based education by 2011, whereas HBO institutions have so far been voluntarily working on implementing competence-based education. Also, the future jobs (including competencies and vocational core problems) of MBO students are more clearly defined (at national level), which makes it easier to design competence-based education for MBOs.

With respect to subquestion ii (Are there differences between the perceptions of students and teachers at both types of institutions?), hardly any significant differences were found between teachers and students. The teachers only had a somewhat higher mean score than the students. In other studies, for example about interpersonal behaviour (Biemans, Jongmans, De Jong and Bergen, 1999; Den Brok, Bergen and Brekelmans, 2006), teachers have generally scored significantly higher when both parties were asked for their perceptions about the behaviour of teachers. The more limited difference found in the current study could be explained by the fact that competence-based education is an innovation for both students and teachers. For students it is certainly a new way of learning, and teachers cannot fulfil their role in competence-based education by applying standard routines or skills. In addition to their more traditional role of expert, the model of CCBE already indicates that other roles (i.e. coach) are becoming important. They may therefore be less sure about their performance and that might explain the comparatively low score of teachers.

Although not significant, the trend is that teachers gave slightly higher scores to each principle, except for one. Principle 6 (students' self-responsibility) was perceived less by the teachers than the students of both MBO and HBO. Rickards and Fisher (2000) also concluded that teachers score lower on giving responsibility than students do, however they do not give an explanation for this phenomenon. It seems difficult to explain this phenomenon, but considering other research it might even have consequences for the learning results of students. Behaviours for which teachers reported higher perceptions than their students have been found to be positively related to students' achievements and motivation, while

behaviours for which teachers reported lower perceptions than students were negatively associated with student achievement and motivation (e.g. Brekelmans, Wubbels and Den Brok, 2002; Den Brok, 2001).

Although HBO and MBO are very different education systems and the reasons to start developing competence-based education are different as well, it is remarkable that both HBO and MBO teachers gave the highest scores to the same principles; namely 2 (vocational core problems), 4 (authentic situations) and 5 (integration K, S and A). In the development process towards competence-based education these principles are probably the most important in emphasising the differences between competence-based education and more traditional education programmes. The importance of these principles could thus be one explanation for the higher scores. Another explanation might be that these are the principles that teachers and developers start working on first when developing competence-based education.

Regarding subquestion iii (Do students' perceptions change over time?), MBO students' perceptions of competence-based education did not show a significant change. The average of the second measurement was practically the same as the average of the first one; and therefore the perceptions of MBO students, and most likely also the curricula-in-action can be regarded as rather stable and not subject to coincidence or social desirability. MBO students work in several periods, however the set-up of each period is more or less the same and in each period the same teachers are responsible for coaching and supporting students. If necessary, experts, other than the coaches, are asked to provide students with necessary information and input. During each period, students work on vocational core problems and when they think they are ready to do an assessment (i.e. collected enough evidence), and their coaches agree, they are allowed to do this. The HBO students did perceive competence-based education to a lesser extent in the second measurement in comparison to the first measurement. A possible explanation for this may be that this HBO institution works with several periods, among which the teaching and learning methods may differ. Whereas MBO students have contact with the same teachers over the course of a year, HBO students have different teachers each period and these teachers can differ in the extent to which they work according to the principles of CCBE.

Concerning subquestion iv (Do students with different learning style characteristics differ in the extent to which they perceive principles of CCBE?), it can be concluded that, because only one significant relationship was found between students' learning style characteristics and their perceptions of competence-based education, groups of students, distinguished by their learning style characteristics, do not differ in their perceptions of CCBE principles. One of the criticisms of competence-based education is that it should benefit students who are good at steering their own learning, but may be detrimental to students who do not posses internal steering qualities. This study only looked at students' perceptions and not their learning results; however since no relationship was found between competence-based education perceptions and learning style characteristics the chance is small that groups distinguished by their learning style characteristics would benefit more in competence-based learning environments than others. This does not necessarily mean that there will be no

differences in benefits between students at all, learning style characteristics, however, do not show differences.

The results showed hardly any differences in this respect between the various MBO institutions, which could be expected, but is still remarkable. It was expected because these institutions are working jointly to realise competence-based education, and remarkable in that the similarity of the scores given by teachers and students from these different institutions indicate that they benefit from this collaboration. They can benefit from each others' experiences and reflect on developments together. This can be an important example for other countries or regions that want to realise competence-based education. On the other hand the comparability could be seen as a drawback of this study; it only includes relatively good examples of competence-based education. It would have been good to compare more traditional education practices with more competence-based education practices to see to what extent the curricula-in-action are really different.

One important aspect that was not taken into account in this study is teaching style (e.g. Bolhuis, 2000). In future research it would be useful to look for relationships between teachers' teaching styles and their perceptions of the educational programmes. Bolhuis (2000) distinguishes between teachers who are more in favour of process-oriented teaching, which has a lot of resemblance to competence-based education, and teachers who are more in favour of a traditional way of teaching. Of course the expectation would be that process-oriented teachers would notice the principles of CCBE to a larger extent than their more traditional education-oriented colleagues, because they might be more open to such a development.

Another aspect that should be taken into account in future research is the status of competence-based curricula-in-action in the institutions versus the so-called intended curriculum. The conclusions of this study are based only on the perceptions of teachers and students, and no information is provided about the objective competence-based education situation. A comparison between the intended and the implemented curriculum could be worthwhile. It could be of added value to compare the perceptions of the parties involved with an objective picture of the situation of the study programme. An objective picture could be composed using a triangulation of method, which would involve questioning different experts (e.g. teachers, developers and external expert), analysing documents and questioning the students. The CCBE model could be used as the starting point for this analysis.

Chapter 5

Job enrichment for teachers due to competence-based education[4]

The aim of this study was to construct a job profile containing roles and tasks for teachers in competence-based education. It was required that this job profile should be considered important by teachers employed in competence-based learning environments in MBO and HBO. Existing job profiles for teachers in MBO and HBO are not constructed for the specific situation of competence-based education. As competence-based education is an important innovation in vocational education in many countries around the world, and teachers are of vital importance for allowing this innovation to succeed, explicating the teacher roles required in competence-based education is pivotal. The model of CCBE provides only a weak impression of important teacher roles and tasks. To construct a more elaborate and justified job profile, first, a literature and document study were conducted and based on these resources a first draft of roles and tasks important for teachers in competence-based education was synthesised. This resulted in a profile containing six roles: expert, coach, assessor, developer, researcher and manager. Next, the tasks were included in a questionnaire that was administered to a group of MBO and HBO teachers (n = 92). They were asked to indicate the importance of the various tasks in competence-based education. A confirmatory factor analysis was performed, which resulted in a profile containing five roles: expert, coach, researcher, developer and manager. Although considered to be important in the model of CCBE, the role of assessor is not considered by teachers to be a separate one. The roles of expert and developer are considered to be the most important roles.

[4] This chapter has been submitted as: Wesselink, R., Biemans, H. J. A., Mulder, M., & Gulikers, J. T. M. (submitted). Job enrichment for teachers due to competence-based education.

Introduction

In this chapter the consequences of the transformation towards competence-based education for the roles and tasks of teachers in MBO and HBO are studied. Competence-based education asks different activities and qualities of teachers (Seezink, 2009) in comparison to more traditional vocational education. It is the aim to compose a job profile consisting of the roles and tasks of teachers in competence-based education and to examine the extent to which teachers consider these roles important to performing successfully in competence-based education in general. A job profile contains the structure (roles) and content (tasks) of a job and is used mainly to improve the quality of (vocational) education and training that prepares people to work in a given sector, and to improve the quality of human resource development within organisations i.e. via personal development, in-service and on-the-job training (Rothwell and Lindholm, 1999).

The following section opens with a description of how job profiles can be compiled. Following this, the roles and tasks of teachers in competence-based education are explored by means of literature and document studies. The description of the research method and the presentation of the results are followed by the conclusions as to which roles teachers consider important to successful teacher performance in competence-based education.

Establishing job profiles

Job profiles are used to describe a job's structure and content. A competence profile consists of a job profile and the competencies required to fulfil the job tasks and roles successfully. The following developments as outlined in the next two paragraphs that have accompanied the realisation of job profiles have been taken into account.

Mulder, Wesselink and Bruijstens (2005) point to emerging theoretical insights that suggest perspectives that should be applied to the study and development of competence profiles. First, a mix of work activity descriptors (i.e. tasks) and worker competence descriptors (i.e. capabilities) is required (Shippmann, Ash, Carr, Hesketh, Pearlman, Battista et al., 2000) or, as it is called by Du Chatenier (2009) and Lans (2009), a multi-method approach. In the multi-method approach, work activities central to accomplishing specific tasks are identified before the competencies necessary to performing those tasks are identified (Sandberg, 2000). Two different methods are required to gain insight into the work-oriented perspective and the worker-oriented perspective. The former takes the work or job as the point of departure and jobs are described by means of task analysis. The latter implies that competencies are seen as capabilities possessed by employees, typically represented in constructs of knowledge, skills and attitudes required for effective work performance (Mulder, 2001). In discussions with professionals about their tasks and jobs, competencies can be identified that are necessary to perform the task and jobs.

In addition, Mulder, Wesselink and Bruijstens (2005) have emphasised the importance of analysing meaningful combinations of tasks (McLagan, 1989) that represent a role or a job. In relation to the job profiles of teachers, Tigelaar, Dolmans, Wolfhagen and Van der Vleuten

(2004) have indicated that these tend to be too detailed and too prescriptive and have lost their meaningfulness. Working with roles and accompanying tasks may overcome this. It is also in this respect an advantage to work with competencies in the more holistic way; details are reduced to a minimum. Too many details, as revealed by the behaviourist conceptualisation of competence, make profiles unsuitable for use in curriculum development (Gonzci, 2004). But there is also a risk of being too general, which was one of the main criticisms of the generic conceptualisation of competence (Hodkinson and Issitt, 1995). To avoid this risk, tasks and roles, this is, the job profile should be used as starting points. This assures that the context in which the competencies are to be applied is taken into account and that the final list of competencies is integrated with the context and thus not too general.

Competence-based education and teachers' changing roles and tasks

The introduction of competence-based education has an impact on the roles and corresponding tasks of teaching professionals (Descy and Tessaring, 2001; Seezink, 2009). Within competence-based education teachers are expected to support students by helping them to integrate knowledge, skills, and attitudes into competencies (Onstenk, 1997). When supporting students in their competence development is the main goal of education, different roles are expected of teachers than when the transfer of knowledge is the main goal. Looking at principle 7 of the model of CCBE, a teacher should be at least an expert (who is able to transfer knowledge) and a coach (who is able to support students' competence development process). However, other principles of the model of CCBE indicate that other roles might also be important. While the model of CCBE provides a first impression of the expected roles, it is necessary to consult other relevant literature resources in order to establish the complete picture. In view of this, the principal research question in the current study was: *What roles and corresponding tasks can be identified for teachers who aim to realise competence-based curricula?*

A contemporary description of the roles and tasks of teachers in competence-based education in MBO and HBO can provide a useful starting point for developing curricula for student-teacher programmes, can be used for performance evaluation purposes and can help teachers to set personal learning goals. Most teachers currently employed in MBO and HBO are not properly trained and therefore not prepared to meet the demands of performing in competence-based education. They are not automatically able to fulfil the new roles that competence-based education requires of them (Seezink, 2009), while they are of importance in allowing competence-based education to become successful.

Teachers' roles and tasks in competence-based education as identified by document analysis

In the Netherlands job profiles for teachers have been defined for several sectors of education. Primary, secondary and higher education, for example, all use them. But these are general profiles that are not sufficiently specific to the current situation in MBO and HBO, nor do they reflect the competence-based approach. The general profiles are national teacher profiles that have been developed in response to a new law in the Netherlands that requires teacher

development so that a certain level of quality can be guaranteed in MBO and other secondary education for example. The foundation that fosters the professional quality of teachers (SBL, 2004) has developed a profile specifically for MBO and other secondary education. This profile was approved by the Dutch Department of Education, Culture and Science and has been used as one of the resources in this study. The profile contains seven aspects: interpersonal ability, pedagogical ability, content/didactical ability, organisational ability, being able to cooperate in teams, being able to cooperate with the environment, and being able to reflect and develop oneself. Another relevant national resource is the study by Beijaard and Uhlenbeck (2001). They studied clusters of teacher tasks in secondary education in general, but in contrast to the former source, Beijaard and Uhlenbeck (2001) used teacher opinions to arrive at a final set of competencies. Their study was conducted in secondary education and was not specific to MBO or HBO. Another relevant point is that this study did not take the specific characteristics of competence-based education into account. Beijaard and Uhlenbeck (2001) distinguish five clusters of tasks: lecturing, facilitating the learning process, teacher professionalisation by means of keeping up to date and being properly informed, organising, and research and development.

Besides these two resources, no other resources containing additional information about the roles and/or tasks of teachers in MBO or HBO could be identified, let alone about the roles and tasks of teachers in competence-based MBO and HBO. In view of this, other resources were consulted as these resources add different, but for the purpose of this study, very relevant perspectives on the roles of teachers: human resource development and workplace training.

According to Lassnig (2001), contrasting MBO and HBO and human resource development can be very productive for the purpose of understanding the roles of teachers in MBO and HBO; a process of convergence is seen in the roles and tasks of both MBO/HBO teachers and human resource development (HRD) professionals (Attwell, 1997). This can also be recognised in competence-based education; the connections between educational institutions and professional organisations in the labour market are growing stronger (Biemans et al., 2004). Teachers support students' development in order to ensure their smooth start in the labour market. HRD professionals aim to continue that development once students enter the labour market; both are held responsible for the development of the student/professional. Therefore, the spectrum of professional tasks, roles and positions of HRD professionals also can be used as a resource for studying the roles and tasks of MBO and HBO teachers. On the basis of various studies (Odenthal and Nijhof, 1996; De Rijk and Nijhof, 1997), the following four roles can be identified (Lassnig, 2001): the instructor or facilitator, the programme designer, the organisation change agent and the needs analyst.

As Biemans et al. (2004) have stated, a strong connection between education and the (regional) labour market is necessary to realise competence-based education. Investing effort in workplace learning is one activity that supports this strong connection. Securing an effective balance between learning in school and learning in the workplace is critical to successfully realising competence development. Teachers are responsible for establishing this

relationship (Wesselink, De Jong and Biemans, 2010). It requires them to be able to create the bridge between workplace learning and learning in educational settings. To do this they must possess some of the qualities of a workplace trainer. Gauld and Miller (2004) investigated the competencies of workplace trainers and they concluded in their study of more than 300 trainers in Australia that the most important activities are 'setting goals and objectives', 'reflecting upon work' and 'evaluating effects and impact of training'. The least important activity in their research was 'having excellent knowledge of the subject'. Nonetheless this activity has been included in this literature study because this study concerns teachers in competence-based education and they are in particular responsible for students' knowledge construction. This decision is supported by research by Tigelaar et al. (2004). Tigelaar et al. (2004) make clear that the following items are considered to be important by teachers in higher education, 'the teacher has thorough knowledge of the subject' and 'the teacher has knowledge of new developments in the subject'.

Based on the literature search described above, the roles common to most frameworks can be summarised as follows: expert, coach, assessor, educational developer, researcher and manager (see Table 5.1). In the frameworks that were used to construct a preliminary set of roles for teachers in competence-based education the roles of assessor and researcher are mentioned less frequently than the others. Nonetheless it is argued that they should be included in the job profile: Regarding the role of assessor, evaluating, diagnosing and monitoring students' competencies is something completely different than checking students' knowledge in a written exam. Moreover, as principle 3 of the CCBE model already shows, assessing in competence-based education does not only deal with assessments *of* learning (that is: summative assessment), but also assessment *for* learning (i.e. formative assessment) (e.g. Birenbaum, 2003). This requires developing competence-based assessment criteria, observing students' performance, collecting and evaluating various sources of student work in relation to these competence-based criteria, but also requires giving feedback on students' performance to help students in developing their competencies any further (i.e. assessment *for* learning). Performing these tasks of an assessor is found to be difficult for teachers, but crucial for competence-based assessments to work (e.g. Clayton, Roy, Booth and House, 2004; McMullen, Endacott, Gray, Jasper, Miller, Scholes, et al., 2003). The other role that is mentioned less explicitly by the resources consulted is the role of researcher. In current times knowledge is changing fast and teachers need to be knowledgeable about the latest developments in their subjects (Tigelaar et al., 2004), about what is going on in professional practice and about the effects of their own educational practice. Furthermore, teachers should be able to support students in researching relevant information sources. For these reasons, the role of researcher has been included separately. Table 5.1 summarises the frameworks used as sources and presents the final set of roles.

Table 5.1 Summary of the sources that contributed to the development of a preliminary job profile for teachers in competence-based education

Source Role	Beijaard and Uhlenbeck (2001)	SBL (2004)	Lassnig (2001)	Gauld and Miller (2004)	Tigelaar et al. (2004)
Expert	education	-pedagogical ability -content and didactical ability	instructor or facilitator	excellent knowledge of the subject	thorough knowledge of the subject
Coach	facilitating	interperson-al ability	needs analyst	sets goals and objectives	
Assessor				evaluates effects and impact of training	
Researcher	-profession-alising; -research and development				knowledge of develop-ments in the subject
Developer	research and development	-able to cooperate in teams; -able to reflect and develop oneself	program-me designer	reflects upon work	
Manager	organising	-organisa-tional ability; -able to cooperate with the environment	organisa-tion change agent		

In the expert role teachers possess relevant knowledge of their discipline, being able to stimulate students to develop this disciplinary knowledge as well (either in a knowledge transmission model or a more active way of constructing knowledge), and stay up to date by scanning the environment and listening to students and colleagues from within their educational institution and professional practice. The role of the coach consists of facilitating students' learning processes (by supporting all the activities of the learning cycle: identifying learning needs, assisting students in reaching the desired results, reflection, etc.) and assisting students in their preparation for their future professions. The assessor is responsible for evaluating, diagnosing and monitoring students' competence level and development, for conducting formative and summative assessments and ensuring that the assessments are authentic by involving relevant persons from practice. Researchers are able to keep

themselves informed about new studies, are able to conduct a research study and are able to apply the results of educational research in their own practice. The developer can be described as designing learning activities and developing learning materials and assessment procedures in cooperation with colleagues. Finally, the manager checks the quality of learning and assessment processes and improves the quality where necessary. The manager keeps in contact with external parties relevant to the learning process, such as workplace trainers and colleagues from other educational institutions.

The various roles are described in more detail by means of identifying tasks. These tasks were identified by means of a literature study, document analysis and discussions with teachers in MBO and HBO. The document analysis used the same documents as those used to identify the roles. Most of the tasks for the roles of expert, developer, and assessor have a strong relationship with the professional requirements formulated in the SBL profile (SBL, 2004) and the profile developed by Tigelaar et al. (2004). For the developer role, the task 'Takes the curriculum of the whole study programme into account when designing new parts of a curriculum' was extracted from the Tigelaar profile. The roles of coach, manager, and researcher are strongly related to tasks formulated in the profile for HRD professionals (Kieft and Nijhof, 2000). An example of a task for the coach is, 'Interacts with students to get a good picture of their knowledge, experiences, working methods and learning needs' and this task has been extracted from the HRD profile (and slightly adjusted to fit the educational environment). In total 26 tasks are described in the preliminary version of the job profile. All these tasks are presented in Table 5.2 in the results section of this chapter.

The remainder of this chapter examines if the theoretical job profile is recognised by teachers working in competence-based education. Considering that competence-based education is in the earliest phase of being implemented, it is not surprising that studies of competence-based education are dominated by exploratory research. In contrast to this, this study tests the validity of the theoretical job profile for competence-based educational practice by means of a quantative analysis. In the following sections the methods, results and conclusions of that study are described.

Method

The main aim of the study was to construct a job profile for teachers in competence-based education. The first step was to consult the literature. The second step was to test the theoretical model in educational practice: to what extent do teachers recognise the six roles in their competence-based educational practice? To do this, it was necessary to collect data in a structured way and therefore the choice was made to work with a questionnaire. Before the construction of the questionnaire is described, the participants who joined this study are described. The description of the questionnaire is followed by a discussion of the way in which the data was analysed.

Participants

Teachers from four institutions participated in this study (two institutions for MBO and two for HBO). The two MBO institutions that were approached were among a group of MBO institutions involved in a national programme that aimed to realise curricula based on competencies. Participation in these national projects indicated that these institutions were working on redesigning their curricula. The two MBO institutions accepted the invitation and volunteered to cooperate in this research. The HBO institutions were also working on realising competence-based education, but on an individual basis. They, too, accepted the invitation to join the research. Teachers of various study programmes were asked to participate in this study and 92 teachers volunteered to participate and completed the questionnaire. This group can be described as follows. Of these 92 respondents, 80% were male and 20% female. More than 40% of the respondents had been working in vocational education for more than 20 years. About 20% had worked fewer than five years in vocational education. The rest (about 40%) was equally distributed between the categories of five-to-ten years of experience, ten-to-fifteen years' experience and fifteen-to-twenty years' experience. All teachers were working on the development of competence-based education. About 10% had more than four years of experience with working in competence-based learning environments, about 40% had experience ranging from six months to four years and about 25% had less than six months' experience with competence-based education.

Questionnaire

The first part of the questionnaire asked for background information. Besides name, sex and age, the number of years of experience in education in general and in competence-based education in particular was asked. The remainder of the questionnaire posed questions about the tasks, as identified in the theoretical part of this paper. Respondents were asked to state the extent to which they regarded the tasks as important for working in competence-based education. They used a Likert scale from 1 to 4 with categories ranging from 'not important at all' (1) to 'very important' (4). Before the questionnaire was sent to teachers, some experts in the field of competence-based education had a look at it and provided some useful comments about how it could be improved. Their comments concerned some of the task formulations and these were modified so that the tasks could be better understood by the teachers. Cronbach's α's for the identified roles (i.e. clusters of task items) are shown in Table 5.3. Except for the role of expert, all α's were satisfactory, where .70 is taken to be an acceptable level.

Data analysis

To examine the relationships between the tasks (dependent variables) and the roles (independent variables) confirmatory factor analysis (CFA) was performed using LISREL (8.72) (Jöreskog and Sörbom, 2005). This tested whether the various roles as identified in the literature study could be found in the questionnaire data as six clusters of task items. It was decided to apply CFA to this research because of its capacity to handle complex multi-

factorial models. Since the data were collected on a 4-point Likert scale, the non-normality of the data led to some problems. In this case, the normal theory method used is the maximum likelihood [ML] method. This is conveniently used in CFA but may result in invalid statistical testing in case of non-normality. However, methods that are insensitive to the non-normal distribution of observations require large sample sizes (Jöreskog and Sörbom, 1986). The current sample size is n = 92. In situations of non-normality and small sample sizes, the ML method appears to be rather robust in comparison to other methods (Jöreskog and Sörbom, 1988) except for χ^2. To correct the overall χ^2 for deviations from multivariate normality with respect to kurtosis, which is often responsible for the biggest problems concerning non-normality in the case of CFA, the χ^2 can be divided by the multivariate coefficient of relative kurtosis (Brown, 1984 in Steenkamp and Van Trijp, 1991).

The overall model fit was assessed by using fit criteria from various families of fit indices. Absolute fit indices χ^2 and root mean square error of approximation (RSMEA) were used. As far as the quality of models is concerned, it is generally assumed that to support a model the χ^2 value divided by the multivariate coefficient of relative kurtosis (= 1.064; values of less than 1.96 indicate a non-significant kurtosis) divided by the degrees of freedom should be less than 2 and the RMSEA value equal to or less than 0.08 indicate a reasonable fit between model and data (Koufteros and Marcoulides, 2006; Browne and Cudeck, 1993). As the RSMEA is dependent on sample size, as recommended by Marsh, Balla and Hau (1996), the non-normed fit index (NNFI) and the comparative fit index (CFI) were also examined. These indices should have values of 0.90 or higher for a good fit (Hoyle, 1995). Cronbach's α of the resulting factors was calculated to get an idea of the internal validity of the roles. Finally, paired sample t-tests were calculated for the factor scores to see whether teachers accord greater importance to some roles rather than others. Where the level of significance is mentioned in the analysis of the results, the level of $p < .05$ is meant.

Results

The covariance matrix was used to conduct CFA. The first step was to check the completely standardised solution of the theoretical model that established the six roles. The first analysis resulted in reasonable fit indices: χ^2 was 319.28 (divided by 1.064 to correct for kurtosis this leads to 300.08) with 284 degrees of freedom, leading to a ratio of 1.05. Both CFI (0.94) and NNFI (0.93) indicate a reasonably good fit of the initial model. The RMSEA of 0.057 tends to support this finding. All the factor loadings and covariances meet the criteria (factor loadings between 1 and -1 and covariances between 1 and -1).

As the preliminary model showed a reasonable fit, correlations between the factors and LISREL modification indices were examined to find possible improvements for the model. Since the factors 'expert' and 'assessor' had comparatively low correlations with the other factors, attempts were made to optimise the model by leaving these factors out of the model completely and, subsequently by relating the task items to another factor. When the assessor items were related to the role of coach, the model's fit improved. The modification indices suggested that it would be wise not to relate all the assessor items to the factor coach

but to relate 'ass1' (organising the contacts with whom to do assessments) to manager and 'ass2' (developing assessment standards) to developer. The items related to formative assessment ('ass3' and 'ass4') remained under coach. Furthermore, the modification was suggested of putting the item 'develop5' (realises adequate summative assessments) under the factor manager. In most cases MBO summative assessments are developed at a national level with colleagues from other MBOs. This entails a great deal of communication and managing of contacts, and this might clarify the suggested relationship with manager. Modification indexes used to alter models to achieve a better fit must be applied carefully and with theoretical justification. Considering the content of the task items mentioned, the changes made seem to be theoretical sound. The new model resulted in better fit indices: χ^2 was 296.00 (corrected for kurtosis) with 285 degrees of freedom, leading to a ratio of 1.04. Again, both CFI (0.94) and NNFI (0.93) indicate that the new model is a good fit. The RMSEA of 0.034 supports this finding. Table 5.2 presents the completely standardised solution of the new model and shows the loadings of the items on the different factors.

Table 5.2 Completely standardised solution arising from CFA (n = 92)

Factor	Item	Item description/task	Loadings
Expert	Expert1	Follows developments in businesses, organisations and society and translates these to his or her own educational practice.	0.32
	Expert2	Broadens his or her own expertise by learning from the experiences of students.	0.71
	Expert3	Is able to bring students into contact with other resources where he/she is unsure of the material.	0.33
Coach	Coach1	Interacts with students to gain a good picture of their knowledge, experiences, working methods and learning needs.	0.53
	Coach2	Compiles together with students a plan to support them in reaching the desired results in time. The plan takes account of students' options and ambitions.	0.56
	Coach3	Supports students by having reflective conversations with them, enabling them to steer their own learning process. This with the aim to realise a thorough and lasting learning process.	0.69
	Coach4	Makes students aware of their capabilities and stimulates students to use them.	0.60
	Coach5	With awareness of his or her own view of a profession, reflects with students on their future profession, and supports them in developing their own professional identity.	0.51
	Ass3	Encourages students whose progress is unsatisfactory to help them realise why things go wrong and how to continue.	0.43
	Ass4	Compares student results with a (national) standard.	0.47

Researcher	Research1	Keeps himself or herself informed about research in his or her profession.	0.66
	Research2	Integrates the results of educational research in existing and new parts of the curriculum.	0.78
	Research3	Studies which instruction methods are the most effective.	0.50
	Research4	Is able to set up and carry out a research project and is able to analyse and report the results.	0.60
Developer	Develop1	Co-operates with colleagues to prepare, carry out, evaluate and improve education.	0.56
	Develop2	Applies in curricula his or her own innovative ideas and those of colleagues and/or students.	0.73
	Develop3	Takes the curriculum of the whole study programme into account when designing new parts of a curriculum.	0.61
	Develop4	Takes the educational vision of the educational institution into account when designing new parts of a curriculum.	0.54
	Ass2	Develops clear criteria to provide students with as reliable a judgement as possible.	0.55
Manager	Manager1	Consults colleagues and gives them feedback when they ask for it.	0.75
	Manager2	Makes a constructive contribution to the various deliberations and forms of co-operation to improve and develop the curriculum.	0.68
	Manager3	Informs stakeholders (e.g. parents) in a professional way and uses the information he or she acquires from them.	0.55
	Manager4	Deliberates with representatives of feeder and subsequent institutions to realise alignment between the institutions.	0.74
	Manager5	Establishes and maintains relationships with organisations and assists them to realise a meaningful and safe learning environment.	0.47
	Ass1	Involves relevant persons from practice or other educational institutions in student assessment procedures.	0.57
	Develop5	Realises proper summative assessments.	0.62

Table 5.3 presents the descriptives that resulted from the second CFA: means, standard errors, and correlations among the roles. It also contains information on scale reliabilities and the number of items per scale. The mean scores all indicate that the roles are considered to be 'important' to 'very important' by the teachers (scores are between '3' and '4', where '3' means important and '4' very important). For almost every scale, the scale reliabilities are acceptable, with the exception of the scale for expert. Concerning the correlations, the role of expert correlates the least with other roles. It has significant relationships only with coach and

manager. The roles of coach, researcher, developer and manager correlate significantly with one another.

Table 5.3 Means (M), standard errors (SE), reliability coefficients, and correlations between the new roles (n = 92)

Scale	Items	M	SE	1	2	3	4	5
1. Expert	3	3.44	.38	0.41				
2. Coach	7	3.23	.36	.36 (**)	0.73			
3. Researcher	4	3.08	.43	.12	.47 (**)	0.75		
4. Developer	5	3.37	.37	.18	.41 (**)	.46 (**)	0.75	
5. Manager	7	3.22	.40	.24 (*)	.64 (**)	.45 (**)	.55 (**)	0.81

Note: Cronbach's α values in italics on the main diagonal

* p<.05, two tailed; ** p <.01, two-tailed

With the set of roles resulting from the CFA, paired sample *t*-tests were conducted to analyse whether teachers accord greater importance to some roles rather than others and, if so, to which ones. The tests revealed that the role of expert is considered to be the most important role. This role is significantly more important than coach (t (86) = 4.63), developer (t (89) = 1.39) and manager (t (84) = 4.20). Another important finding of this analysis is that the role of developer is more important than the roles of coach (t (86) =3.25), researcher (t (86) = 6.44) and manager (t (84) = 3.77). While the five identified roles in the new profile were perceived as important, the expert and developer are the most important of the five roles identified.

Conclusion and discussion

The main aim of this chapter was to investigate what kind of roles define the job of a teacher in competence-based education. The first step was the construction of a theoretical profile. The starting point for this construction was provided by the model of CCBE, which guided the search for other relevant resources. The preliminary set of roles was a synthesis of various roles, as mentioned in several theoretical resources and documents, and existing profiles in vocational education and human resource development. The preliminary set consisted of six roles: expert, coach, assessor, researcher, developer and manager. Confirmatory factor analysis examined if teachers recognised the theoretical identified roles. This showed that the number of roles should be reduced to five; LISREL modification indices indicated the wisdom of assigning the tasks of the assessor role to other roles and examining the content of these tasks, this seemed a valid step to take. Accordingly, the final model consists of five roles: expert, coach, researcher, developer and manager. The inclusion of the role of assessor in the theoretical model was motivated by the importance of both formative and summative assessment in competence-based education. However, from the data it appeared that teachers did not regard the tasks identified for the role of assessor as being specifically 'assessor' tasks. It is remarkable that the role of assessor is not recognised by participating teachers as a distinct role. While this is consistent with the documents that have been consulted (Beijaard and Uhlenbeck, 2001; SBL, 2004; Lassnig, 2001; Tigelaar et al., 2004), it is not consistent with

the importance attributed to the assessor role as extracted from the CCBE model. The assessor tasks and activities are considered to be important yet they cannot be categorised as a distinct set of tasks. For this reason the assessor has not been recognised as a role. Teachers consider assessing to be coaching (formative assessment), developing (assessment instruments) and managing (contacts to arrive at summative assessment instruments). On the contrary, various studies showed that the role of assessor is crucial in competence-based education and certainly for ensuring the quality of competence-based assessment, but that this role is not easily 'played' by teachers (e.g. McMullan et al., 2003). Perhaps the fact that teachers do not perceive the role of assessor as a separate role agrees with the findings that this role is not performed well in competence-based practice. Developing competence-based assessments and assessing students' competence-development is indeed a cornerstone of many professional development initiatives for teachers (Gearhart and Osmundson, 2009; Webb and Jones, 2009).

According to teachers in competence-based education the roles of expert and educational developer are the most important of the five roles identified. The other roles (coach, researcher and manager) were also considered to be important. All the roles in the job profile correlate with two or more other roles significantly and this could indicate that the roles form a coherent set. It is this coherent set that is necessary to realise competence-based education. This does not necessarily mean that all roles should be performed by one teacher; the roles can also be performed by a team of teachers, but it is necessary to ensure that all roles are performed.

It is remarkable that the roles of expert and developer are considered to be the most important ones. These roles show some resemblance to existing roles in more traditional education in which knowledge transfer is the main aim: transmitted knowledge obviously requires having expert knowledge, and every teacher has always been responsible for developing his own lessons and activities in class. Unfortunately, it is not possible to compare the results of this study with the results of previous studies, in which more conventional education provided the research context. Thus no conclusions can be drawn about any differences between important roles in traditional learning environments and competence-based learning environments in which competence development is the main aim. The results of this study indicate that the roles of expert and developer continue to be important ones and that teachers in competence-based education have additional roles to fulfil; one could speak of job enrichment. In general, the teachers who participated in this study had substantial teaching experience. It may be that their experience, including that of more traditional forms of education, explains this result. The roles of expert and developer continue to be considered to be important regardless of whether the innovation of competence-based education is taking place.

The results of this study were obtained and analysed in a systematic way and validated by means of confirmatory factor analysis. Owing to the small sample size (n = 92), the results should be interpreted carefully. Although the aim of the research was to confirm a model, the data required the application of a more developmental approach; the initial model

was adjusted in the analysis. The outcomes of this study should be tested in a cross-validation study. Furthermore, owing to its unsatisfactory reliability, the expert scale should be dealt with carefully. This problem may be due to the small number of items present on the scale. In spite of this, the role of expert has been maintained because it has a distinct role in this profile (and many others in the past) and is considered by the teachers to be one of the most important roles in the job profile. The items related to the role of expert could be revisited in a cross-validation study to improve scale reliability. Furthermore, the whole job profile should be interpreted with reservation because of the post-hoc character of the analysis. Moreover, it would be advisable to use Likert scales with more than four options. Many items in the questionnaire were rated with '3' or '4', which indicates that most task items in the list were considered fairly important. Giving teachers more scope to differentiate on the scale would probably provide more nuances in the data and, in turn, in the analysis. Besides, it would be good to repeat the study since the teachers in this study were in the phase of developing competence-based learning environments and their roles may not yet have crystallised. Having said that, the results of this study could be used as the starting point for further research.

There is as yet no tradition of systematically analysing competence-based education. This study cannot justly reflect the many variations within all the different national vocational education systems let alone the international systems. The results of this study are limited to the Dutch MBO and HBO context. All the institutions that participated in this study did so voluntarily. The participating MBO institutions all participate in the same national programmes, which makes their situations fairly comparable. It is probable, therefore, that the results of this study may be representative of all MBO institutions delivering life sciences education in the Netherlands.

The characteristics of education aiming to realise competence development are different from those of traditional education. Teachers currently working in educational institutions are not trained to provide competence-based education. They need to undertake professional development activities (Seezink, 2009) to become proficient at delivering competence-based education. The job profile as established in this study can support them in self-reflection and in identifying the best direction for their personal development. Similarly, it can prepare student teachers for their future roles in vocational and professional education by helping them to develop the competencies necessary to fulfil the roles and tasks required by competence-based education. The profile also can be used for other human resource management activities, such as selection and staffing. In this study, a first step has been taken towards establishing a competence profile. This has involved determining the roles and tasks (in the form of a job profile) of teachers in competence-based education. The next step of actually realising a competence profile should involve determining the competencies necessary to fulfil the roles and tasks as identified in this study. A good method of doing this may be to hold group interviews with teachers currently working in competence-based education, taking the job profile as the starting point.

The results of this study show clearly that in competence-based education several teacher roles can be identified. This insight makes it possible for institutions to let teachers opt for a specialisation. The teachers participating in this study reported their belief that all the roles are important. This does not imply that one teacher should perform all these roles. The profile can make teachers more aware of the various requirements of competence-based education. In turn, this enables them to make a considered choice as to which role or set of roles they want to perform.

Developing new roles to realise competence-based education requires effort on the part of both the individual and the organisation. Individual teacher development can be facilitated by establishing an innovation-supportive culture within educational institutions (Knapp, 1997; Bottrup, 2005). According to Garet , Porter, Desimore, Birman and Yoon (2001), long-term programmes focusing on individual learning are not beneficial. Teacher learning should take place in the workplace (Lohman, 2006). Seezink (2009) identified several advantages of workplace learning specific to teachers: when learning takes place during work or with colleague teachers, transfer is less problematic than when it is necessary to develop the roles in a formal course. Workplace learning can lead to more sustained effects because workplace learning is a continuous process that is undertaken with a team of teachers. Finally, debates with colleagues should give rise to improved understanding and a culture that may support innovations such as competence-based education. It is recommended, therefore, that teachers be allowed to develop the new roles in competence-based education in their workplaces, together with their colleagues. The job profiles identified in this study can be helpful in steering this development. Like the students themselves, self-development is also required of teachers and educational institutions as they endeavour to realise competence-based education

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Chapter 6

Principles of the model of comprehensive competence-based vocational education as footholds to improve the connectivity between learning in school and in the workplace[5]

Recent developments towards competence-based education have stimulated institutions for vocational education to improve the connectivity between learning in school and learning in the workplace, which has been a problem for decades. In previous research, a theoretical model describing the underlying principles of competence-based education was developed. In this study, three principles of the model of CCBE were identified as useful to analyse connectivity between learning in school and learning in the workplace. These principles concerned authentic situations (principle 4), students' self-responsibility (principle 6) and roles of expert and coach (principle 7). Three stakeholder groups (students, teachers and workplace trainers) involved in MBO were questioned on these principles. Based on the results, it can be concluded that the selected principles provide insight into the problems related to connectivity. Since stakeholder groups hold different conceptions of workplace learning and do not communicate adequately about mutual responsibilities, the implementation of these principles of CCBE has not yet improved the connectivity situation significantly. Nevertheless, these principles can guide stakeholder groups in making clearer agreements about mutual responsibilities, which may improve connectivity in the future.

[5] This chapter is based on Wesselink, R., De Jong, C., & Biemans, H. J. A. (2010). Apects of competence-based education as footholds to improve the connectivity between learning in school and in the workplace. *Vocations and Learning, 3* (1), 19-38.

Introduction

Especially to realise the competence-based education goal to bridge the gap between education and labour market, a strong connection between education and the (regional) labour market is necessary (Biemans et al., 2004). Students in competence-based study programmes should be offered the opportunity to develop their competencies in professional settings comparable with settings in which they are going to function after graduation. So, learning in the workplace is becoming more important (Van den Berg and De Bruijn, 2009) and should be made possible together with private and public organisations and/or enterprises. And that makes that the interrelationship between learning in school and learning in the workplace is an important issue in realising competence development.

In this chapter, the results of a study on the interrelationship between competence-based education on the one hand and the connectivity between learning in school and learning in the workplace on the other will be presented and discussed. In the following section issues of connectivity between learning in school and learning in the workplace will be described, followed by the central research question. Thereafter, the research method and results will be described. Conclusions will be formulated as to how principles of the model of CCBE can be used as footholds to improve the connectivity between learning in school and learning in the workplace.

Connectivity

In the Dutch MBO learning in the workplace is formalised by the Adult & Vocational Education Act of 1995, which prescribes that a student has to spend a considerable amount of training time (20% to 60%) in a workplace setting. It is not solely because of the Act that learning in the workplace has taken on a pivotal role in education, but also because of educational arguments. Among others (Hardy and Parent, 2003; Eraut, 2004) Van der Klink (1999) suggested various reasons, in addition to financial and efficiency advantages, for the growing attention that has been paid to learning in the workplace over the past few decades. On the basis of his research, he concluded that students are more motivated if they see and experience the profession towards which they are being educated. Students are in this way also offered possibilities to develop their competencies; and the transition to professional practice is assumed to become easier if students already have some practical experience.

Although Van der Klink (1999) mentioned several benefits, he also stressed that the effectiveness of learning in the workplace was not always taken into account in research. The supposition is that spending time in practice is beneficial for the learning results of students. However, recent studies on the actual learning in the workplace have revealed many concerns about the relationship between vocational education and professional practice. Several scholars claim that spending a portion of vocational education time in the workplace does not automatically denote educational enrichment (Hardy and Parent, 2003; Eraut, 2004; Griffiths and Guile, 2003). Furthermore, Hardy and Parent (2003) stated that spending time in professional practice does not necessarily mean that education has been integrated into the

work environment; that the students have taken advantage of the learning resources available in the workplace(s); that interrelationships between theoretical knowledge and practical experiences have been stimulated; nor that the development of skills in problem-solving or the usage of learning experiences in other situations has been encouraged.

Eraut (2004) also highlighted in his research concerns about the interrelationships between theoretical knowledge and practical experiences. He questioned whether there is any transfer of knowledge from education to the workplace and vice versa and whether it is possible to talk about *the* knowledge. According to Bereiter (2002), six different types of knowledge are necessary to become a competent expert: statable knowledge, implicit knowledge, episodic knowledge, impressionistic knowledge, skills and regulative knowledge. Bereiter (2002) emphasised that in high-level expertise these types of knowledge are not separate but tightly integrated. It is difficult to develop one or more types of knowledge in school, and the other knowledge types in the workplace. The entire range of knowledge types should be developed in relation to each other. Therefore, the (learning) activities of students in schools and workplaces should be integrated to enable students to become competent professionals.

Griffiths and Guile (2003) called this process of integration the connectivity between learning activities in school and learning activities in the workplace. Connectivity refers to bringing together aspects of the learning process that were previously separated (Tynjälä, 2009). Tynjälä (2008) described the connectivity model of Griffiths and Guile (2003) as follows: the core of the model is making a 'reflexive' connection between formal (e.g. resulting in statable knowledge) and informal learning (e.g. resulting in implicit knowledge), and between 'vertical' and 'horizontal' learning - the former referring to students' conceptual development, the latter to the development of students' capacity to work in different contexts. The idea is to bring students into new situations (resituate) in which they can learn in a way that requires them to draw upon their formal and conceptual learning. The aim is to develop poly-contextual and connective skills, which enable 'boundary crossing' by students (the ability to work in changing and new contexts).

Realising connectivity requires close cooperation between educational institutions and workplaces: therefore, the central role of schools and training providers is to develop partnerships with workplaces to create environments for learning (Tanggaard, 2007). Griffiths and Guile (2003) formulated four practices that can be stimulated in these learning environments and through which connectivity could be realised. These four practices make the abstract concept of connectivity more concrete. The first practice crucial to all learning is that of thinking. Thinking is characterised as a process guided by procedures or social practices with dialogue and argumentation as central activities. Students should thus make use of the opportunities for dialogue and argumentation in the workplace and in school. The second practice is 'dialogic inquiry'. This practice allows less-experienced people to work appropriately with the given cultural resources by means of assistance from more experienced others, afforded by the environment or the provision of specialist tools to resolve a problem. The third practice is 'boundary crossing'. By this process 'horizontal development' is

stimulated through participating in different contexts. The fourth practice is 'resituating' knowledge and skills: seeing an original activity from a new perspective, rather than trying to extract it as general heuristic knowledge from its original context, which is known as transfer.

Connectivity in relation to competence-based education

One of the main aims of competence-based education is to prepare students to make the transition from learning to working in the labour market without too many problems. To realise this aim, the demands to incorporate learning in professional practice in curricula are increasing. To fully benefit from the presupposed advantages of learning in professional practice, optimisation of the connectivity between learning in school and learning in practice is crucial. In this study, the model of CCBE (see Wesselink et al., 2007) is used to analyse connectivity in MBO in the life sciences in the Netherlands. This leads to the following research question: *Do the defining characteristics of competence-based education provide footholds to improve the connectivity between learning in educational institutions and learning in the workplace?*

Only the principles of CCBE concerning instruction (and thus not those concerning content) are considered to be relevant for this analysis. In the Netherlands competencies, vocational core problems and lifelong learning competencies are predefined for MBO and therefore principles concerning the content are not included in this analysis. Furthermore, principle 3 (assessment) is not taken into account, because it concerns assessment and in this study the synchronisation of learning activities in school and in the workplace (not including assessment) is of interest. The following principles are relevant. Principle 4 (authentic situations) is relevant, because when students are invited into more than one authentic situation (in this case authentic means professional practice) they are enabled to cross boundaries and reflect on these experiences in the various settings, which makes resituating of knowledge and skills possible. The sixth (students' self-responsibility) and seventh principles (roles of expert and coach) are also important for this process of reflection. Principle 6 concerns the self-responsibility of the student. The student him- or herself has to report on activities (e.g. dialogues or argumentations of colleagues or teachers) which he or she regards as meaningful learning activities and which can be used as a starting point for reflection. Principle 7 concerns the role of teachers and workplace trainers. Teachers should become more of a coach without losing their role as expert and support students while they are reflecting on meaningful learning activities. Workplace trainers increasingly play a role as well in students' reflection on meaningful learning activities instead of only acting as an expert or employer. Reflection on meaningful learning activities can take place both in school and in practice: it is a shared responsibility of teachers, workplace trainers and students. To conclude, these three principles of CCBE (4, 6 and 7) are regarded as relevant for studying the connectivity between learning in school and learning in the workplace.

The intention of this study was to examine the concept of connectivity from a stakeholder point of view because learning in the workplace is a multifaceted process: there is no single understanding of learning at work (Boud and Garrick, 1999). This stakeholder perspective

was also chosen because of the research of Poortman (2007). She concluded that the benefits of workplace learning do not meet the expectations of the different stakeholders because these stakeholders do not fulfil their mutual responsibilities. Considering the three principles of CCBE that are related to connectivity, three groups of stakeholders can be identified: students (especially important for principle 6), teachers and workplace trainers (especially important for principle 4 and 7). These groups of stakeholders all have their own perceptions of the three principles of CCBE related to connectivity as realised in educational practice.

Method

In this study the focus was on two cases that each represent an educational programme at the same MBO institution. This institution began preparing for competence-based education more than five years ago and in the last two years it has used the principles of CCBE as starting points for designing (or redesigning) its curricula. The new curricula have been well received and several other institutions for MBO in the life sciences have adopted the same competence-based learning activities. The institution also aspires to serve as a career guidance centre and a support centre for regional enterprises and organisations that can profit from its expertise. In the Netherlands this institution is known for its innovativeness and for this reason it was chosen to involve this institution in this research.

The first programme selected for this study is called Flowers, a programme in which students learn to make and sell flower arrangements. Flowers is offered at all four MBO levels and students who were in their second year of the third level were included in this study. The second educational programme selected for this study, is called Contracting. A contractor in the context of life sciences is an independent professional (or an employee of a contracting company) hired by a farmer to perform activities on the land that the farmer is unable to do him- or herself, because of time restraints or lack of equipment. Examples of such activities are ploughing or fertilising. In this case students who were in their second year of the second and third levels were included. A general description of these two educational programmes is given below, followed by detailed information about the participants and instruments used in this study.

General description of Flowers programme

The Flowers curriculum is structured as follows. After a short introduction period, the students are prepared for the competence-based education process. The role of the actors in competence-based education is illustrated and the organisation and cooperation between the institution and the participating companies are explained. Students are assessed with respect to competencies they already master. Depending on the results of the intake they subsequently participate in the following kinds of learning activities: professional training in internships, selected assignments, practical training or professional projects (in groups) organised at several points in the school year. These learning activities prepare the students for proficiency tests, which are ill-defined problems in authentic situations that have to be solved by the students. The learning activities are selected jointly by the student, teacher, and

workplace trainer. Some assignments are carried out in school, others in the workplace during internships. The students work two days per week in practice and the remaining three days in the educational institution. Much effort is spent on the students' reflection process in order to stimulate self-responsibility. Students are expected to write weekly reports and discuss these with their teachers and/or coaches.

General description of Contracting programme

In the first two weeks students acquaint themselves with the MBO institution and the company at which they will complete their internship. An important activity in these first weeks is an intake in which the students' competencies are assessed. During the third week students are informed about learning activities they can do to prepare for their proficiency tests. Students select a set of learning activities and discuss with their workplace trainer and their teacher which of these activities are suitable for the workplace and which assignments should be done in school. The students themselves plan when they are going to do which activity. They only have to take into account the final date on which they will take the proficiency test. Teachers try to visit the internship-companies three times per year. The rest of the year the students work for two days in practice and spend the other three days in the educational institution. Students are asked to write a weekly report reflecting on their experiences.

Participants

In this study three different groups of stakeholders were questioned in the months November and December of 2007: students, teachers and workplace trainers. In total 25 Contracting students and four Flowers students participated, all of whom were in their second year and between 16 and 18 years of age. In the case of Contracting, all 25 students of one class joined the study because the teachers had reserved a specific time for this session. In the case of Flowers, the four selected students were the only ones in their group who had completed an obligatory assignment; for this reason, the sizes of the two groups differed considerably. All ten teachers involved in Flowers joined the study, including those responsible for general subjects such as foreign languages and math. Only two teachers from Contracting participated - teachers responsible for more general subjects or traditional disciplines were absent. All teachers had several years of teaching experience as well as skills and practice in designing and providing competence-based education. The workplace trainers were selected by the teachers because of their involvement in education. Eight workplace trainers for Flowers participated in this study and five for Contracting. Since all workplace trainers had monitored groups of students before and after the shift towards competence-based education, they were capable of comparing the two situations. Table 6.1 summarises the numbers of interviewees per stakeholder group.

Table 6.1 Numbers of interviewees

Stakeholders / Programmes	Students	Teachers	Workplace trainers
Flowers	4	10	8
Contracting	25	2	5

Group interviews

The most prominent stakeholders in competence-based education are students, teachers and workplace trainers. In this study, these three groups of stakeholders were questioned about their experiences with and perceptions of the connectivity between learning in school and learning in the workplace in competence-based education.

For each group of each programme a group interview was held. This method was considered to be most suitable since developments with respect to the combination of competence-based education and connectivity are rather new and complex and not suitable to ask in questionnaires. In case of an interview clarification could be provided to explain a question if it was not clear. Also, in this way teachers, students or workplace trainers could within their group determine their interpretation of situations or what is significant about a particular situation. A disadvantage of this type of questioning is that individual responses are excluded. However, in group interviews the participants have time to think before speaking, so the responses are often more considered than in an individual interview or questionnaire (Krathwohl, 1993; Baarda, De Goede and Teunissen, 2001).

The interviews of all groups can be described as semi-structured. The three principles of competence-based education mentioned above (principles 4, 6, and 7) were used as starting points for the topics of the interviews. The questions thus concerned authentic situations (principle 4); students' self-responsibility (principle 6); and the roles of expert and coach (principle 7). The respondents also had the opportunity to talk about related topics. The interviews took about 90 minutes and were always conducted by two researchers. One researcher asked questions while the other took notes. The answers of all stakeholder groups were compared and analysed in terms of similarities and differences.

Results

The results are described per educational programme and per stakeholder group. The responses of each stakeholder group are structured thematically on the basis of the three principles (see italic words). The results are summarised in a table at the end of the results section.

Flowers programme - Students

Flower students indicated that they tend to learn most from practical situations in projects both in and outside school. Projects are very popular because results are tangible and students can be proud of their efforts. During projects students from several school years work together in small teams on assignments from real customers and these *authentic* conditions stimulate the development of an active and entrepreneurial attitude.

The students were not satisfied with the start of competence-based education in the school year 2006-2007, claiming that the introduction lacked focus. In the subsequent school year, however, much progress was made and it is now made more explicit what the students are expected to learn and how. The students indicated that they learn and work in a more *self-responsible* way than they were accustomed to when they started their education. Several students stated that competence-based education fits better with their personal learning goals. Others commented that their self-responsibility in learning is sometimes overrated, which has a negative effect on their learning efforts. Certain basic knowledge should be offered in a more instruction-based way. These students felt that more structure is thus needed in competence-based education. In general, however, the students do not want to return to the traditional or conventional system of vocational education mainly characterised by teaching.

Students experience the administration of their projects and exercises as less functional ('a pile of paperwork') for the actual learning results. They are also convinced that the cooperation between the MBO institution and companies in professional practice should be improved. The school's timetable dictates the possibilities for the students to work as apprentices. Moreover, the *teachers'* instructions and exercises are not sufficiently adjusted to the professional practice of the companies. According to the students, *workplace trainers* experience some of the exercises as not very realistic. Many exercises are also limited to a few topics, for example styling and design. The students' freedom in choosing learning routes is limited at the moment. Finally, competencies are insufficiently aligned to the professional context in the companies. In general, the teachers still decide upon the study programme of the students.

Flowers programme - Teachers

The teachers reported that they have put much effort into creating a portfolio of relevant assignments, training exercises, practical information sources and databases. Together with colleagues from other MBO institutions in the life sciences they have constructed a back-office of learning activities, called the 'Green Lab'. Practical and *authentic* learning are the initial starting points. The assignments, training exercises and practical information sources outline learning activities for the students in order to prepare them for proficiency tests. On the basis of the 'Green Lab' back-office it is possible to compose learning arrangements for each student. Ideally, a learning arrangement should be based on learning questions of the student. However, to achieve more balance and structure in the organisation of the school, many learning activities are compulsory. Neither the student nor the workplace trainer composes the learning arrangements - it is the teacher's responsibility. Because of the intake one might expect individual learning routes. At the moment, however, these are absent.

According to the teachers, the goal of developing a high level of *self-responsibility* among the students is not being achieved. As a consequence, continuous involvement of the teachers is necessary. The level of development and motivation of students can be increased by offering them more choices. Practical work strongly increases their learning efforts as well. Motivation to learn general subjects, such as foreign languages and mathematics, is enhanced

by integrating these subjects into the contexts of jobs and enterprises. Motivation of the students is a critical factor in competence-based education. Students with less self-responsibility and initiative will be less successful in competence-based education.

The *teachers* are actively involved in improving the internal organisation of the programmes in order to facilitate competence-based education. A pitfall is the complex administrative load, which results in a pile of paperwork for teachers, students and workplace trainers alike. At the same time, the curriculum is becoming more transparent. Transparent and concrete pathways to the proficiency tests supported by effective registration of students' achievements and performance may improve the situation. The teachers are proud of their team efforts in the transition towards competence-based education. Factors such as cooperation, energy and support, even from critical co-developing colleagues, are being recognised as important. Individual teachers are proud of their personal growth and the improvements that have been achieved in education, information and communication technology, and coaching skills.

Flowers programme - Workplace trainers

Workplace trainers want to be involved in constructing *authentic* assignments and exercises. According to them, coaching of students should be improved. Workplace trainers would appreciate visits from competent and interested teachers, but teachers are usually too busy to fulfil these tasks. According to workplace trainers, students are in general less positive about their education compared with the more traditional educational system.

According to the workplace trainers, competence-based education is only suitable for a minority of the students. The high demands of the workplace cannot be fulfilled by many of them. Competence-based education favours the independent, strong students, who are able to steer their own learning process. Too many students have not been well prepared for working in a company or even for an interview for an apprenticeship. The level of basic knowledge, for instance arithmetic and botanical knowledge, has decreased in general. A customer-oriented attitude and basic social abilities are expected, but many students are also less skilled in this respect.

The cooperation between *workplace trainers* and *teachers* is still unsatisfactory. Some parts of the educational programme and proficiency tests do not fit into the schedule of professional practice. Workplace trainers are convinced that teachers are the most important link in bridging the gap between the professional life sciences sector and MBO. Innovations such as competence-based education will not achieve their full effect if teachers do not reconsider and change their position in the educational process. The influence of companies on the educational process should increase. In general, teachers are insufficiently familiar with current activities in professional practice. According to workplace trainers, the best possible teacher is the teacher who also works part-time as a professional in an enterprise. Full-time teachers should take a period of retraining in professional practice. The cooperation between the MBO institution and the companies should also be organised in a more flexible way in order to anticipate circumstances in professional practice. Nowadays, students are

absent at many important moments in flower shops such as Mother's Day, Valentine's Day and the Christmas period, so the MBO institution should align its programmes to the calendar of the companies to a greater extent. Working and learning together has multiple advantages: students can learn, companies provide continuity and competent students can obtain jobs.

Contracting programme - Students

Students are clear about the tasks they enjoy. Whether in school or in the workplace, they like working with tractors and the *authentic* setting of a contracting firm is attractive to many of them. Students dislike writing their weekly reports as they have difficulty converting their learning experiences into words. Therefore they do not devote enough time to completing them. These reports could play an important reflective role if the students gave them more attention.

Students are required to make a plan with which learning activities they are going to do. They experience this as relatively easy. So, according to the students, they can be held *responsible* for their own planning of the learning activities. But sticking to their schedule is difficult for them, even in situations in which the workplace trainer is informed about their plan. Students reported that they do the job that is required of them by their workplace trainer but forget to complete school assignments during busy periods. The students said they would prefer to work in school on these assignments because there they have the time to do so. In this regard, students requested more guidance from the teachers. Furthermore, the students indicated that they can learn a lot just by discovering for themselves or by observing their *workplace trainers* on the job. They expressed that they do not need assignments to study theoretical backgrounds; they prefer to learn by actually doing their job. According to the students, that is enough. 'Just let us work in practice'.

Contracting programme - Teachers

Teachers indicated that this way of providing education motivates students. But a disadvantage of learning in practice or in *authentic* settings is that some more general competencies and skills remain unnoticed or these aspects only get attention in school. In practice the focus is mainly on competencies and tasks directly related to the profession. Therefore, teachers try with the help of workplace trainers to make the students more aware of the importance of these general competencies and skills.

Teachers indicated that, in competence-based education, the role of workplace trainers has become more important. If the workplace trainers would emphasise that assignments are important, then the students would see the added value as well. According to the teachers, *workplace trainers* and *students* are jointly *responsible* for these assignments. That is the most important role for workplace trainers. The teachers indicated that they are in need of relevant assignments that can be carried out in the workplace and a useful set of reference books in which the students can find information themselves. Current facilities are not suitable for competence-based education and are still 'instruction-based', thereby limiting the possibilities for students to be responsible for their own learning process.

Contracting programme - Workplace trainers

Workplace trainers mentioned that students, when they are working in the *authentic* setting of the contracting firm, should ask more questions than they currently do. Students should not have the idea that they are just there to work hard and show their capacities. Although proving one's capabilities may enhance the chance of securing a job, students must be aware that this should not happen at the expense of the learning process.

The workplace trainers are satisfied with the fact that students have to participate in an intake. This provides *workplace trainers* with information that can be used during the practical training. Workplace trainers are also satisfied with the regular visits of the teachers, as this makes it easier to agree upon assignments that can be done in the enterprise. That is a clear role for the teachers. However, workplace trainers revealed two important drawbacks of the current situation with respect to their own role and the *self-responsibility* of the students. Students only occasionally inform workplace trainers about their learning activities. Workplace trainers think students do not allow themselves enough time to work on the assignments, because they believe they have to be continuously profitable for the company. That is strange, because all workplace trainers claim to emphasise the importance of creating a climate in which the students feel they have enough time to work on the school assignments. All workplace trainers share the opinion that students should be invited to the enterprise to learn things and not just to work. Not knowing the students' learning activities makes it difficult for workplace trainers to coach the students in completing the assignments. Moreover, workplace trainers think that the assignments are not always sufficiently clear. Table 6.2 summarises the results of this study as reported above.

Table 6.2 Summary of conceptions per stakeholder group and per relevant CCBE principle

		Principle 4 Authentic situations	Principle 6 Self-responsibility	Principle 7 Role of supervisors
Flowers	Students	Vocational core problems are introduced into the educational process and students like it.	Self-responsibility should be gradually obtained in a controlled way.	Teachers should provide more structure in the learning process.
	Teachers	Competence-based education can only be developed in a team and requires organisational skills.	The development of self-responsibility of students is currently insufficient and should be increased.	Starting point for realising competence-based education is the schools'internal organisation.
	Workplace trainers	Workplace trainers should be more involved in the educational process, e.g. in constructing assignments and training teachers.	Self-responsibility currently appears to favour strong students: only they will succeed.	Teachers should break out of the school system and put the vocational core problems of the workplace trainers-companies in a central position.

		Principle 4 Authentic situations	Principle 6 Self-responsibility	Principle 7 Role of supervisors
Contracting	Students	Working in practice is the most motivating part of education. Students say they learn from working in practice.	Students consider themselves able to make a plan with learning activities, but they experience difficulties sticking to that plan.	The teacher should help students plan their learning activities. Workplace trainers are role models.
	Teachers	More general disciplines may not receive enough attention during learning in the workplace.	Current assignments are too focussed on instruction-based learning and do not facilitate the self-responsibility of the students.	Workplace trainers together with students are responsible for realising assignments in companies.
	Workplace trainers	Students get the chance to learn while working in practice; they are not seen as personnel.	Students should be made aware of the fact that it is their responsibility to learn.	Teachers should visit the companies to agree upon the assignments to be done.

Conclusion and discussion

In this chapter the developments towards competence-based education in Dutch vocational education in life sciences are described in relation to the problems concerning connectivity between learning in school and learning in the workplace. The importance of workplace learning is increasing through the implementation of competence-based education, but the relation between learning in the workplace and learning in school still does not meet the expectations. According to the connectivity theory of Griffiths and Guile (2003), connectivity between learning in the workplace and learning in school should be realised to provide the necessary support for students to become competent professionals. But the question remains how connectivity can be realised. In this chapter, the following research question was formulated: Do the defining characteristics of competence-based education provide footholds to improve the connectivity between learning in educational institutions and learning in the workplace? Three principles were selected to be worthwhile to include in the analysis: authentic situations (principle 4), students' self-responsibility (principle 6) and roles of expert and coach (principle 7). The following stakeholder groups were consulted in this study: students, teachers and workplace trainers. The three principles of CCBE were used to question the three stakeholder groups and to analyse their different points of view.

All stakeholders recognise the growing attention being paid to learning in the workplace as observed by Van der Klink (1999) and many others and they are convinced of the added value of learning in the workplace; problems and questions put forward relate to how learning in the workplace can support the learning process and not whether learning in

the workplace should be part of the educational programme. Students in particular indicated that they really like learning in the workplace; learning by doing is their preference. Teachers still have some doubts (e.g. about whether all disciplines are sufficiently taught in this way and to what extent students can be responsible for their own learning?), but they recognise that working in professional practice motivates the students. Workplace trainers indicated that they would be happy to see teachers visit the workplaces more often. Furthermore, in their opinion, teachers should incorporate learning tasks in the educational programmes of students which are more relevant for professional organisations. Finally, they would like to see that decisions are made jointly about which assignments will be done in school and which will be done in the workplace.

It is remarkable that the stakeholder groups have different conceptions when it comes to learning in the workplace. Students regard learning in the workplace mainly as working, whereas workplace trainers and teachers see learning in the workplace mainly as learning. Both teachers and workplace trainers interpret workplace learning more as guided learning (learning by means of specific assignments), whereas students see workplace learning more as experiential learning (learning by doing; see Simons, Van der Linden, and Duffy, 2000). A possible consequence of these different conceptions could be that agreements are interpreted differently. Furthermore, students do not recognise all possible learning activities as such. Job-performance activities and participation in practice are activities they recognise as learning activities. However, the learning environment offers many more meaningful learning opportunities like social interaction, imitation and transmission (Poortman, 2007). Students have to be made aware of all these possible learning activities by their teachers and workplace trainers.

Another remarkable issue concerns responsibility for the learning process in the workplace (see Poortman, 2007). According to the workplace trainers, the teachers should be primarily responsible for the learning activities and, therefore, also for the learning process in the workplace. According to the Contracting teachers, however, the workplace trainers together with the students are responsible for the learning process in the workplace. Students see themselves as being more and more responsible for their own learning process; they want to define their own learning goals, plan their own learning activities, and only if necessary ask a teacher or workplace trainer for support. However, both teachers and workplace trainers expressed doubts about the extent to which the students are really able to be self-responsible. As long as the different groups involved in workplace learning do not share mutual expectations about responsibility, this will remain a problem. Without clear agreements between all parties involved about mutual responsibilities it will be difficult to realise connectivity.

The three principles of CCBE examined in this study appeared to be useful as footholds to provide insight into issues of connectivity. The most important concerns in this respect are the different conceptions held by the various stakeholder groups of what learning in the workplace entails and the lack of agreement on the division of responsibilities for learning in the workplace. Furthermore, problems were mentioned concerning the

assignments students have to do. Teachers say that these assignments are still too 'instruction-based', whereas workplace trainers say that the assignments are not aligned to daily businesses in the companies. In this respect principle 2 (vocational core problems) would also have been interesting to have a look at in this study.

Stakeholders should be aware of the different conceptions of workplace learning (guided vs. experiential learning). Students may not recognise all of the possible learning opportunities in the workplace, because of their conception of learning in the workplace. This has consequences for reflection processes. During reflection processes students should be made aware that a discussion with the workplace trainer or another colleague can also be seen as a learning activity. Teachers and workplace trainers together are responsible for this reflection and for bridging the gap between theory learned in school (or in other contexts) and experiences in practice. Students themselves are hardly able to make the connection between what is learned in school and in practice, because they mainly 'work' in practice. For most students in the case studies, reflection is not part of their learning process because of their learning by doing approach. Teachers and workplace trainers have to challenge the students to think about the things that they have done and learned. Teachers are responsible for the students' competence development process as a whole, because in MBO different workplace trainers are involved in the students' learning process and that makes it difficult for them to cross boundaries with students.

Griffiths and Guile (2003) approached connectivity from the perspective of the learning process and defined practices that could improve connectivity. However, this chapter shows that the conceptions of workplace learning and the responsibilities of the various stakeholders for the learning process in the workplace should be taken into account in the connectivity model as well. These two issues will have to be dealt with before concrete workplace learning activities like dialogic inquiry and border crossing can show their added value.

This study illustrates that the principles of competence-based education can offer footholds to analyse the connectivity between learning in school and learning in the workplace; however, as such, this does not guarantee an improvement of connectivity. To realise improvement stakeholders should determine their mutual responsibilities, they should clarify their points of view on workplace learning and work on better practical assignments. Based on the three principles of CCBE used as a starting point for this study, the following recommendations can be made. First, clear agreements should be formulated on which learning or working activities (and what these activities should look like) should take place in which situation (principle 4). Second, the stakeholders should be made aware of each other's views on workplace learning. Finally, the stakeholders should share each other's expectations concerning mutual responsibilities (principle 6) and which roles the teacher and workplace training supervisor should fulfil in this learning process (principle 7).

In further research the numbers of students, teachers and workplace trainers to be questioned should be increased and belonging to other sectors to get a more general picture.

A more in-depth study approach could be applied and in that case it would be interesting to have a closer look at the actual (reflection) conversations between student and teacher and between student and workplace trainer.

Connectivity between learning in the workplace and learning in school has been a concern for many decades. Because of the introduction and implementation of competence-based education, the expectations about learning in the workplace have only been increasing and the same is true for the importance of connectivity between learning in school and learning in the workplace. The three principles of CCBE used in this study (authentic situations, students' self-responsibility and roles of expert and coach) appeared to offer the opportunity to take a closer look at connectivity issues and if the conclusions addressed in this study are taken into account in the interaction between students, teachers and workplace trainers, this can have a positive impact on improving connectivity in the near future.

Chapter 7

General conclusion and discussion

This final chapter summarises and combines the results of the studies described in the previous chapters. Following a description of the main findings, the importance of the integration of knowledge, skills and attitude into competencies, the integration of competencies with the context, integration of competence-based education itself and at the organisational level to realise the implementation of competence-based education is emphasised and explained. Integration appears to be important at various levels. Focusing on integration affords an insight into the most important characteristics of competence-based education, besides the eight CCBE principles. Subsequently, several critical remarks are made, suggestions for future research are given and the implications for educational practice are outlined. As the studies in this thesis are inextricably interwoven with the Dutch context, the final section describes some important elements of the Dutch context.

Introduction

Since the results of each study are discussed successively in chapters 2 to 6 respectively of this thesis, this chapter goes a step further by discussing the main findings in a broader perspective. The first section recaps how these studies have answered the underlying research questions as formulated in the introduction. Afterwards the relevance of the results for theory and practice is addressed and the results are discussed in a broader sense. Next, the strengths and weaknesses of the studies are discussed. Subsequently, directions for future research and the practical consequences for developing competence-based education are distilled. Finally, in the last part of this chapter, the implementation of competence-based education in the Netherlands is discussed; this is relevant because the studies in this thesis are inextricably interwoven with the Dutch context.

Main findings

Competence-based education is a popular educational innovation in MBO and HBO in the Netherlands. It is expected, firstly, to prepare future professionals so that they will be able to perform properly and without too many teething problems in their future jobs and as participants in society as a whole (see Jenewein, Knauth and Zülch, 2002); and secondly, to reduce the number of students leaving education before attaining their qualifications. Yet competence-based education is an ambiguous concept; there is no consensus about what exactly it means, neither in theory nor in practice. Despite the conceptual confusion, competence-based education is being applied widely in educational practice. So how does it manifest itself in practice? The lack of an accepted definition leaves scope for practitioners (i.e. teachers) to claim they are working in a competence-based manner while continuing to work according to traditional principles. Conversely, practitioners whose work is actually based on competencies do not always recognise this or claim to work accordingly. Thus, besides conceptual clarity, clarity in practice is also needed. This situation gave rise to the two aims of this thesis. The first aim is to conceptualise and operationalise competence-based education by defining it in terms of underlying principles and four stages of realisation. The second aim of this thesis is to investigate competence-based education, with the help of the model that resulted from the first aim and described the underpinning characteristics of competence-based education. This has the aim to investigate how competence-based education manifests itself in educational practice. Research questions 1 and 2 relate to the first aim of this thesis and research questions 3, 4 and 5 relate to the second aim.

The lack of an accepted definition of the concept of competence-based education provided the starting point for the first study. The main objective of the study was to clarify the concept. The findings of this study inform chapter 2, which addresses the first research question: 1. *What are the defining characteristics that should be adopted in a curriculum that aims to develop students' competencies (as seen from the perspective of the holistic conceptualisation of competence)?* The first draft of the model of competence-based education originated from a synthesis of

various theoretical perspectives. Inspired by developments in, for example, human resource development, workplace learning, social-constructivism and Total Quality Management (TQM) (e.g. Tanner and Tanner, 1995; McClelland, 1998; Eraut, 1994; Schön, 1983; Van Merriënboer, 1997; Wenger, 1998; Onstenk, 1997; Powell, 1995), a first draft of defining characteristics was compiled. This work also drew on the initial ideas of Mulder (2004) as to what competence-based education should entail. The aim of this study was not only to come up with a set of defining characteristics, but also to construct a set of characteristics that was approved by various research experts in the fields of both vocational and competence-based education. By means of a focus group session and a Delphi study, the preliminary set of characteristics was reformulated; competence-based education was conceptualised by means of eight principles. For each principle one to four underlying variables were identified, and on the basis of these variables the stages of realisation were defined (from 'not competence based' to 'completely competence based') as seen in TQM models. The stages of realisation relate to the operationalisation of competence-based education. The principles are closely interrelated and concern both the instructional aspect (*how*) and the content aspect (*what*). Owing to this integration and duality of character, and to distinguish it from other models that also define competence-based education, the model of competence-based education has been labelled as *comprehensive* competence-based education (CCBE).

Realising competence-based education is a complex activity and tools to support and manage this process are welcome. Nonetheless, any tool benefits from having the approval of its user community. In this case, the model of CCBE was intended for use by teachers and developers responsible for realising competence-based education in their educational institutions. Research questions 2a and 2b, covered primarily in chapter 3, read as follows: 2a. *Are teachers and developers, who are redesigning their curricula towards competence-based curricula, able to work with a model that synthesises all the defining characteristics of competence-based education?* 2b. *To what extent do they think that working with such a model is useful?* Teachers and developers were invited to use the model of CCBE in one of their team meetings to determine how competence-based their curricula were. This team meeting was systematically observed. Afterwards the teams were interviewed in a structured way about the added value of using the model. Teams appeared to be able to reach consensus internally, but it was not clear to what extent the interpretations of the various teams were comparable. Teachers and developers were very able to work with the model. It provided them with footholds for analysing in a clear way their current educational situation with regard to competence-based education. Teachers and developers indicated that using the model empowered them to make clear choices and agreements concerning the (future) development of their study programmes and it provided them with clear arguments with which to explain their choices to their managers.

As described in chapter 1 of this thesis there is considerable ambiguity about the concept of competence and this ambiguity offers practitioners the scope to replace existing labels (e.g. knowledge and skills) with more contemporary labels, such as competence, while changing very little in practice. This gives rise to the question of whether competence-based

education is actually being realised and the extent to which educational practices in educational institutions are genuinely changing. The study described in chapter 4 of this thesis provides an answer to research the third question: 3. *To what extent is it possible to use a model that synthesises all the defining characteristics of competence-based education to investigate curricula-in-action that purport to be competence based?* The model of CCBE, as reported in chapter 2, was used to construct a questionnaire and, in turn, this questionnaire was used to survey students and teachers on a large scale. Based on the results, it was concluded that the implementation of competence-based education in MBO and HBO is genuinely taking place in educational practice and that the model offers a useful way of investigating this. MBO and HBO students alike and MBO and HBO teachers alike perceived the underpinning characteristics of competence-based education in their curricula-in-action; MBO students more so than their HBO counterparts. Repeated measurements showed that MBO students had a stable perception of the 'competence-based-ness' of their curriculum while HBO students' perceptions differed at the two measurement moments. The final conclusions were that there were hardly any significant differences between students' perceptions and their teachers' perceptions and that the CCBE model offers footholds to not only study intended curricula (see chapter 3) but also curricula-in-action.

Educational institutions involved in implementing competence-based education are engaged in a radical educational reform, one that has substantial implications for teachers (Descy and Tessaring, 2001; Seezink, 2009). With the implementation of competence-based education, teachers can no longer adhere solely to their former roles within a knowledge transmission model; they need to change their teaching practices in order to facilitate the competence development of students. Research question 4 is reported in chapter 5 and reads as follows: 4. *What roles and corresponding tasks can be identified for teachers who aim to realise competence-based curricula?* Information from a diverse set of literature resources and relevant documents (i.e. job profiles) in combination with a large-scale teacher questionnaire and confirmatory factor analysis resulted in five teacher roles: expert, coach, researcher, developer and manager. The most traditional role of expert is considered to be the most important one and developer is defined as being the second most important. All five roles were perceived as more than averagely important for realising competence-based education. This indicates that working in competence-based education means job enrichment for teachers. Initially, the role of assessor was included in the list of roles. By the end of the study, however, the teachers did not considered it to be a discrete role. Tasks related to the assessor role were categorised as belonging to the roles of coach, developer and manager. Teachers do not have to fulfil all these roles themselves, they can opt to specialise. The job profile as identified in this study can support teachers and their human resource managers in making relevant choices concerning personal, professional and organisational development.

The introduction of competence-based education has increased the importance of learning in the workplace and has emphasised the importance of connectivity between learning in an educational setting and in the workplace. According to the connectivity theory of Griffiths and Guile (2003), connectivity between learning in the workplace and learning in

an educational setting should be realised to provide the necessary support for students to become competent professionals. This raises the question of whether and how competence-based education can be used to improve this connectivity. In chapter 6, the fifth and final research question is answered: 5. *Do the defining characteristics of competence-based education provide footholds to improve the connectivity between learning in educational institutions and learning in the workplace?* Three principles of the model of CCBE were selected as the means for taking a closer look at connectivity issues and were used to interview groups in a systematic manner. These three principles addressed the instructional side of competence-based education (i.e. how to deliver competence-based education). Two study programmes were examined as cases by means of group interviews with stakeholders (students, teachers and workplace trainers). One insight that can be gained from this chapter is that no stakeholder group questioned whether learning in the workplace should be part of the educational programme, their doubts concerned how learning in the workplace can support competence development. All stakeholders were convinced of the added value of learning in the workplace for the competence development of students. The cases showed that connectivity was not being realised to its full extent because teachers and workplace trainers tended to interpret workplace learning as guided learning, whereas students saw workplace learning rather as experiential learning. Another problem with connectivity that was identified concerned the responsibility for the learning process in the workplace (see Poortman, 2007). As long as the various groups of stakeholders involved in workplace learning do not share the same expectations about responsibility, this remains a problem. This study illustrated that the three principles could offer footholds for analysing the connectivity between learning in school and learning in the workplace. Such analysis alone, however, cannot bring about an improvement in connectivity.

By means of the model of CCBE, competence-based education has been conceptualised (principles) and operationalised (stages of realisation) in accordance with the first aim of this thesis. The second aim was to study how competence-based education manifests itself in practice. With the help of the model of CCBE, it turned out to be possible to analyse and describe competence-based education in practice. This led to some valuable insights (i.e. teacher roles, connectivity) into current educational practice.

Research findings in an integrated perspective

The validity of describing the approach to competencies as adopted in this thesis as holistic or, others have done (Delamare Le Deist and Winterton, 2005), as integrated is discussed in chapter 1. Based on the results of the studies, it can be concluded that 'integration' is a characteristic shared by various aspects of comprehensive competence-based education: competence itself, the principles of CCBE and the implementation of competence-based education. In view of this, the main findings of this thesis are discussed below in a broader sense with regard to integration.

Competencies derived from the holistic conceptualisation

In chapter 1 the concept of competence is defined and the adjective 'holistic' is used to establish the emphasis on the *integrated* character of competence. Knowledge, skills and attitudes are interconnected and together they form competencies that must be demonstrated in professional practice. The relevance of this interconnectedness is demonstrated in this thesis by the fact that principle 5 ('knowledge, skills and attitudes are integrated in both learning processes and assessments') was re-introduced during the Delphi study. First, the principle was deleted from the preliminary set because the integration of knowledge, skills and attitudes was taken to be a self-evident characteristic of competence. However in practice, the situation appeared to be less clear cut than this. The respondents of the Delphi study, therefore wanted to emphasise the integrated characteristic of competence and it was re-introduced. The importance of developing competencies in a close interrelationship with professional practice has been shown in chapter 6. Meaningful learning occurs only when theoretical knowledge, skills and attitudes as learned in school can be applied in relevant situations in practice. Competencies without any relation to professional practice are too general and make no sense to students. It is essential, therefore, that competencies be integrated with contexts in order to make them meaningful.

The fact that curricula should make use of the integration of knowledge, skills and attitudes, does not implicate that knowledge acquisition and knowledge testing are not allowed in curricula. Being a vital element of competence development (Miller, 1990), knowledge acquisition should be an integral part of the curriculum plan; there is no question of knowledge disappearing from the curriculum plan. Students still need knowledge and will need it in the future to become and remain competent professionals. It is surprising that teachers argue against discrete knowledge testing while students and workplace trainers argue for incorporating knowledge testing in authentic assessment (Gulikers, 2006). Discrete knowledge testing as a part of authentic competence assessment is in line with current ideas about the assessment of competencies in which old (i.e. traditional) and new methods of assessments are combined to assess competencies appropriately (Baartman, Bastiaens, Kirschner & Van der Vleuten, 2006). Testing knowledge discretely should be possible, even in the holistic approach to competence, but competence assessment should always comprise a selection of assessment methods, such as knowledge testing, observation, performance assessment and a portfolio (Baartman, 2008). Assessing knowledge should be instrumental to competence development and not a goal in itself.

Comprehensive competence-based education

The principles of CCBE are presented in chapter 2 as a set of principles that are strongly *integrated* and interrelated. It is the combination of the eight principles that defines competence-based education (Biemans, Wesselink, Gulikers, Schaafsma, Verstegen and Mulder, 2009). Many of the principles are not unique to competence-based education but it is the combination of these principles that distinguishes competence-based learning environments from more other educational innovations. This primarily theoretical notion of

interrelatedness is supported by the results presented in the various chapters. In chapter 3 all the principles are shown to be useful to teams of practitioners responsible for developing competence-based curricula, to debates about competence-based education and to making decisions about plans for the development of competence-based education. The model of CCBE provided practitioners with possibilities for analysing the whole curriculum. In chapter 4 it is shown that both students and teachers recognised all the principles. The principles were not all recognised to the same extent, but all of them appeared to be present in the competence-based learning environment. All the principles should be taken into account when realising competence-based education; a selection of them is insufficient. This means that if competencies are taken as starting points for curricula, educational institutions or study programmes must also adjust their instruction. The what of competence-based education cannot be changed without changing the how.

Integrated management to implement competence-based education

The comprehensive nature of competence-based education makes it necessary that the realisation of competence-based education should be seen as a radical educational innovation process (Kouwenhoven, 2003). Accordingly, the implementation and realisation of competence-based education requires changes and cooperation at different levels within educational institutions (and in the case of MBO at a national level, e.g. nationally defined and mandatory competence-based qualification framework). While conducting this research, it became apparent that several facilities are necessary to realising competence-based education. At the institutional level, the facilities required include appropriate rooms where students can work on assignments; time for teachers to cooperate and discuss with each other; time for teachers to establish connections properly with workplace trainers and to realise true connectivity between learning in school and learning in professional practice; time for teachers to develop new teacher roles; and the flexibility to prepare and perform assessments. Many facets of educational institutions need to be changed to make competence-based education work. Besides changes to the curriculum, instruction and assessment (as included in the model of CCBE), changes are needed to, for example, the organisation of the educational institution. Supportive ICT tools (e.g. portfolio management) need to be amended to make competence-based education work. The studies reported in chapters 3, 5 and 6 reveal that the realisation of such changes involves all institutional levels. Realising the change to competence-based education is a team effort (Kouwenhoven, 2003). As well as teachers, these teams consist of institutional managers, workplace trainers and students. All groups should be aware that change is not an event but a process. The change should not be imposed on teachers; teachers should be part of the process. Moreover, the change process should be monitored and managed (Kouwenhoven, 2003).

Several reviews of competence-based education have shown that teachers are the determining factor in effectively implementing competence-based education (Van den Berg and De Bruijn, 2009; Smith, 2010). However, it requires teachers to fulfil new roles. Therefore investing time and money in the professional development of teachers should be given

serious attention. Giving teachers and developers the responsibility of designing competence-based education encourages them to take ownership of their own continuing professional development (Seezink, 2009). This remit requires teachers to collaborate with colleagues from different disciplines, backgrounds, and perspectives. They become members of a team that is responsible for designing or redesigning a study programme (see chapter 3). Moreover, chapter 5 shows that teachers have to fulfil different roles (expert, coach, developer, researcher or manager) and chapter 6 shows that teachers should establish a close relationship with workplace trainers (one of the tasks of the manager role). No teacher is required to fulfil all these roles. There should be a process by which teachers can opt for the roles that suit them best or that best engage their talents. In addition, teachers should be offered learning options (formal or informal) by which they can develop the competencies necessary to perform their roles. Teachers should become broader professionals, and they must make choices about what role or combination of roles they want to perform within competence-based education. That one teacher does not fulfil all the roles implies that teachers will have to cooperate with one another. As a result, the development, implementation and maintenance of competence-based education at the institutional level are similarly *integrated*, both vertically (teachers and managers) and horizontally (among teachers); all parties must be brought together to develop competence-based education to its full extent and to manage and maintain teacher quality.

Critical remarks

Multiple research methods were applied in the studies of this thesis in order to answer the five research questions. The Delphi study reported in chapter 2 resulted in a validated model of CCBE. Observation was used to examine how teams of teachers used the model of CCBE. Questionnaires based on the model of CCBE are reported on in chapter 4. They were used to measure perception and, as reported in chapter 5, to investigate the roles of teachers. Group interviews, as reported in chapter 3, were used to investigate the added value of working with the model of CCBE for teachers and developers and, as reported in chapter 6, to analyse connectivity issues and with the aim of making improvements in connectivity. While the various methods have been discussed in the chapters, a word should be said here about the conditions in which the methods were used. Importantly, the research in this thesis is both applied and developmental by nature. As explained in chapter 1, besides developmental aims, all the studies conducted aimed to produce results that could be useful to educational practice (in this case MBO and HBO). Accordingly, the research activities took place in the complex situations of MBO and HBO. Instead of researching competence-based education as an isolated development, competence-based education was researched in its complex environments. Such an approach does justice to the complexity of reality and ensures that MBO and HBO practitioners recognise the findings of the studies. Moreover, it enabled them to use the results right away; ecological validity was guaranteed. However, in some cases this had consequences for the research. In some cases, teachers were unable to attend meetings due to time restrictions, students were unable to do a group interview due to work commitments, and so on. It is difficult to identify exactly how the applied character affected

the research. Still, this should be borne in mind when interpreting the conclusions drawn in this thesis.

The institutions for life sciences education who participated in the studies of this thesis all did so voluntarily. Voluntary participation meant that educational institutions were not afraid of showing their current state of competence-based education and in most cases these institutions had some level of confidence about the way they are performing in this area. Moreover, the studies reported in chapters 3, 4, 5 and 6 involved the same MBO institution, as well as some additional institutions for life sciences education. All of these participants can rightly be regarded as front-runners in the development and implementation of competence-based education. The institution whose participation was the most extensive holds a leading position in the realisation of competence-based education in the life sciences education in the Netherlands. The studies done for this thesis took place in the period 2004-2008 and the developmental character of the studies diminishes the relevance of the issue of representativeness. Researching an educational innovation that eventually has to be implemented on a large scale requires the researchers to start studying and monitoring the front-runners. In view of this, the research results described in this thesis should not be seen as being representative of the situation in education for life sciences in the period of 2004-2008, let alone for all MBOs and HBOs in the Netherlands. But, the experiences and research results of the front-runner institutions can be valuable to other study programmes and educational institutions who are currently struggling with developing and implementing competence-based education. At a national level, MBO institutions for life sciences education in particular cooperate very closely and this ensures that the 'peloton' institutions can learn relatively easily from the front-runner institutions.

Another critical issue has to do with the context of this research. Since it was commissioned by the Dutch Ministry of Agriculture, Nature and Food Quality, this research concentrates only on institutions for life sciences education at MBO and HBO level. It is possible that the results of this study are not valid in sectors outside life sciences. The educational institutions for life sciences are relatively small in comparison to educational institutions for MBO and HBO outside life sciences and it is comparatively easy for them to cooperate, even at a national level. Therefore, educational institutions for life sciences can proceed rather quickly with developments in comparison to their larger counterparts. On the other hand, the larger institutions tend to have more resources (people and money) available to realise such developments as competence-based education.

Implications for future research

Before the implications for future research are described, the uniqueness of the model of CCBE in its current form is explained. Describing its uniqueness provides insights in possibilities for future research. The uniqueness of the model of CCBE can be attributed to two factors: the way the model has been constructed and the current content of the model. In contrast to other models that address principles for developing competencies (Jonnaert, Masciotra, Barrette, Morel and Mane, 2007; Kouwenhoven, 2003), the model of CCBE

originated from a synthesis of various theoretical perspectives (e.g. social-constructivism, human resource development) and was validated in a systematic way in cooperation with research experts and practitioners in the field of (competence-based) vocational education. Other models have not been validated by experts nor practitioners. The theoretical foundations and subsequent extensive Delphi study increase the likelihood of a model of CCBE having been developed that is valid for both research activities and educational practice. Another unique characteristic of the model of CCBE is that it contains stages of realisation that can guide educational institutions in the process of designing competence-based education. This kind of operationalisation in stages of realisation is lacking in comparable models that attempt to embrace all the elements that are addressed in the model of CCBE, such as the concept of powerful learning environments (De Bruijn et al., 2005) and the CLOP scan (abbreviation of competence-based learning and development) (Wijntje and Van den Berg, 2005).

Another feature of the model of CCBE described in this thesis is its attempt to gain an overarching picture of what competence-based education should entail. Overarching means that the picture includes all the relevant facets of competence-based education. As yet, no studies have been carried out that include all the facets of competence-based education (Van den Berg and De Bruijn, 2009); research has been restricted to isolated aspects of competence-based education such as assessment (Gulikers, 2006; Baartman, 2008), career conversations (Mittendorff, 2010) or knowledge development (Koopman, 2010). This model of CCBE, however, makes it possible to describe study programmes, including the *how* dimension and the *what* dimension. The *how* dimension concerns the instructional aspects of the model while the *what* dimension concerns the content aspects of competence-based education. Integrating these two dimensions provides a more complete picture of the degree of competence-based education of a study programme; it goes beyond analysing aspects of the study programme. Based on the studies in this thesis, it is argued that this duality is very important in competence-based education. When concentrating only on the *how* dimension, the risk is run that the instructional principles become a goal in itself, whereas competence development should be the goal (Van den Berg and De Bruijn, 2009). When concentrating only on the *what* dimension, the chance that the educational processes do actually change is low; learning trajectories should change systematically to actually develop competencies. In Australia, for example, teachers implementing competence-based education suffer from the fact that the *how* and *what* are not dealt with coherently, leading to thin pedagogy and a narrow focus on the assessment of individual elements of performance (Smith, 2010).

Although the studies of this thesis are restricted to life sciences education in the Netherlands, it is to be expected that the model can be applied in all other vocational education sectors as the model has no principles that are specific to the life sciences sector. The research by Sturing (2010) is the first step in this direction. Moreover, Sturing's research also aims to decrease as far as possible the differences in interpretation of the model of various teams and to investigate factors that are crucial for the successful implementation of competence-based education.

As the results of the studies are also restricted to the Dutch context, future research should clarify the extent to which they are applicable in other countries. Not only is the context (i.e. position of vocational education) in other countries different, but also the understanding of competence and the meaning attributed to it may differ from what is accepted in vocational education in the Netherlands (Brockmann, Clarke, Méhout and Winch, 2008; Winterton, Delamare Le Deist and Stringfellow, 2005; Mulder, Weigel and Collins, 2007). This makes it necessary to do research and investigate the extent to which this model suits the contexts and conceptualisations of competence used by other countries. Experience of applying the model of CCBE in foreign countries (i.e. delivering courses in an international context) shows that the principles make sense; they provide practitioners from abroad with an overview of what competence-based education means. Really applying the principles in a foreign context, however, requires an extra step in the translation to that new situation.

This thesis draws no conclusions about the competence levels of students on leaving school having participated in competence-based learning environments compared with students who have experienced a more traditional, knowledge/discipline-oriented learning environment. Although knowledge is an element of competence, knowledge development does not seem to be an appropriate indicator of performance, neither for students leaving more traditional learning environments nor for students leaving competence-based learning environments (Koopman, 2010). While some preliminary indicators of the positive effects of competence-based education are discussed in the next section in this thesis, the added value of competence-based learning for student learning, motivation and drop-out should be proven in future research.

The model of CCBE can be used to clarify the extent to which study programmes can be characterised as competence-based and these findings (ranging from 'not competence based' to 'completely competence based') can be used as an independent variable in studies in which employee performance (e.g. over several years in longitudinal studies) is studied as a dependent variable. Besides performance, other useful indicators are the number of months graduates had to look for a job and unemployment numbers; variables include drop-outs, intrinsic student motivation and competence development during the educational programme. Naturally, it would be necessary to control elements such as the country's economic situation, sector developments, personnel numbers needed in the relevant profession and gender. This can be achieved by means of for example regression analysis. Consequently, studies of this kind need to be repeated in several years if valid conclusions are to be drawn. In this way, evidence can be provided of the extent to which competence-based study programmes have a positive or negative influence on the student learning and employee performance of individuals who have completed a vocational study programme. This section has explained what should be measured in future in order to show the possible added value of competence-based education. Based on the experience of doing research in the field of competence-based education, a preview can be given of the expected effects of competence-based education. This preview is presented in the following section.

A preview on the effects of competence-based education

Some critics say that competence-based education is old wine in new bottles, yet the studies of this thesis show that the formal adherence to regulations and agreements without there being any real consequences for curricula is not how competence-based education is being implemented. On the contrary, the curricula studied do have characteristics that are recognised by both teachers and students as being the underpinning principles of competence-based education. The model of CCBE does seem to be reflected in actual educational practice. From this point forward, it would be worthwhile conducting effect studies.

Conclusive results about the extent to which the aims of competence-based education are being attained are not yet available (Van den Berg and De Bruijn, 2009). This is because at this stage of competence-based education development and implementation, completely competence-based programmes and graduates of these programmes do not yet exist. Nonetheless, based on the results in this thesis, a preview can be attempted of the extent to which the goals of competence-based education might be reached in future. To recap, competence-based education has two major goals. Its first goal is to bridge the gap between the labour market and education, enabling graduates to start working in a profession without too many problems. Its second goal is to decrease the number of students who quit their education programme due to loss of motivation. Based on the experience of developing this thesis, it can be stated that the distance between MBO/HBO and the labour market seems to be reduced by intensive cooperation (e.g. when competencies and vocational core problems are defined with the approval of professionals; when learning increasingly takes place in several authentic situations). Workplace trainers, who are professionals in the labour market, indicate that they appreciate the developments leading towards competence-based education (as shown in chapter 6) and that they expect that this, in turn, will create professionals who have fewer teething problems when starting work than their counterparts from more traditional education settings. (Having been workplace trainers for many years, they are able to compare the old and new situations.)

As regards the second goal, MBO students really like working in professional practice (see chapter 6). As this is a vital characteristic of competence-based education, this may indicate that students would prefer competence-based education to traditional education. This, in turn, might keep down the drop-out rate of competence-based education. On the other hand, competence-based education asks a more active role of the student. Although the studies in this thesis do not reveal that students do not like to see their responsibilities increase, the students themselves indicate that they are not always able to stick to their planned learning activities (see chapter 6). For students who are not able to handle this responsibility or who are not open to support, this form of education might be too demanding in this respect; they may quit earlier than would have been the case had they joined more a traditional study programme.

Implications for educational practice

As shown in the first chapter of this thesis, competence-based education is a trend in many different countries. But the way competence-based education has been operationalised in practice remains rather unclear. This is impacted to some extent by the conceptualisation of the concept of competence. The model of CCBE enables the analysis of competence-based study programmes in various educational institutions in the Netherlands. If the model were to be validated internationally, it could also be used to compare the educational activities related to competence-based education in different countries. In this way, a thorough picture could be built of the developments that are underway in one particular country, say, or within Europe. Comparing the state of study programmes can be useful for research and/or policy purposes.

For practical purposes, the model of CCBE has added value as a tool with which to analyse the extent to which a study programme is competence based. The study described in chapter 3 reveals that the model of CCBE helped teachers to discuss and identify their understanding of, approach towards and development of competence-based education within their institution. Furthermore, it empowered them to make conscious choices about future developments and to decide the extent to which they wanted their curricula to become competence based. As the study described in chapter 4 shows, the model of CCBE enables the analysis of the status of competence-based education by means of the curricula-in-action. Although not discussed explicitly in this thesis, the model of CCBE also makes it possible to describe the intended curricula. The two pictures gained should be compared to identify any differences and to decide how these differences could be aligned, if necessary. Aligning the intended curricula and curricula-in-action can greatly improve the study programme and its effects on students (Van den Akker, 2003).

All institutions for MBO must realise competence-based education. The new competence-based qualification framework that underpins all assessment-building in these institutions, have been approved by the Dutch Department of Education, Science and Culture and is mandatory. As shown in this thesis, implementing these profiles (i.e. the *what* of competence-based education) requires new instruction methods and didactics. Educational institutions are responsible for transparently applying thise competence-based qualification framework. The model of CCBE could help institutions to show what kind of improvement activities they are applying to implement the competence-based qualification framework and to realise competence-based education and what, if anything, they intend to change in the future. The model can be used as a self-assessment instrument with the purpose of encouraging reflection on the quality of competence-based study programmes. It can also provide footholds for improvement. Together with the self-assessment instrument for competence-based assessment (Baartman, 2008), teachers and developers are provided with a total package with which to evaluate and improve their competence-based study programmes and assessments.

Other educational sectors (e.g. universities) can benefit from competence-based education. But competence-based education as described in this thesis is best applicable to

studies where learning a practical profession is the ultimate goal (Gulikers, 2006). If a practical profession (nursing or plumbing) is the learning goal, competencies and vocational core problems can be identified easily and are recognised by students as being important to their future job. For study programmes where the final profession is less clear or more complex than in MBOs, identifying a clear set of competencies and vocational core problems is more difficult. In universities, for example, the professions students end up in are more diverse and abstract (i.e. business manager) in most cases and this makes it difficult to work with one unambiguous set of competencies and vocational core problems. Everwijn, Bomers and Knubben (1993) claim that, based on experiences in their study programme for Business Administration, both modes of learning (domain-specific knowledge and competence-based learning) are needed simultaneously and in an integrated way. They started changing their study programme based on the stories of the front-runner Alverno College Milwaukee, U.S.A. (1981) that was also one of the first resources consulted with respect to this thesis. Although the competence-based approach to education is seen as useful for universities, there are many hurdles to overcome before competence-based education can be realised in universities (Mulder, Gulikers, Biemans and Wesselink, 2009). Universities do recognise the necessity of aligning their curricula with the needs of society and the labour market. They are obliged to account for societal responsibility; regular visitations are conducted to let universities show how relevant their curricula are. However, implementing competence-based education to its full extent is probably too great a step for universities since disciplines and knowledge are key elements of their programmes. Universities can and do profit from the move towards competence-based education (e.g. working with real-life societal challenges as professional core problems), but they themselves must determine the extent to which they should realise competence-based education.

Consequences of competence-based education

The implications of using the model of CCBE in practice are described above. But what are the consequences of implementing competence-based education for educational practice. It is impossible to be conclusive but, based on the experience of doing research in this field, two important consequences can be identified.

Students should become responsible for their own learning process. But before students are able to do this, they need to develop competencies to enable them to take responsibility for their own learning process. This requires learning activities that enable students to think about their own learning needs and about learning activities and to bear responsibility for their own progress. The extent to which students are able to take this responsibility, and the degree of guidance students need to develop these self-directed learning skills, will differ for different individuals and types of students. Some students will be very competent at steering their own learning while others will need support. Consequently, implementing competence-based education requires flexible, tailor-made programmes at the student level. The person is the crucial focal point of competence development (Jonnaert et al., 2007). Each student should be seen as a customer of competence-

based education and the programmes should be adjusted to facilitate individual learning trajectories more than is the case in more traditional programmes.

This thesis has shown that making the move towards competence-based education requires a great deal of teachers: teachers have different ideas, interpretations and understanding of what competence-based education entails, and it requires them to become proficient in new and different roles. This issue should be taken up by institutions for teacher education. Moving towards competence-based education requires student teachers to be prepared for the roles they may or will adopt. The professional development of student teachers who are trained to work at MBO or HBO level should take account of the principles of CCBE. This will give them experience of what it is like to be a student in a competence-based learning environment and will prepare them to fulfil the various roles required of them. Perhaps student teachers should be given the opportunity to choose and specialise in certain roles.

The Dutch situation

The studies described in this thesis are, as mentioned earlier, inextricably interwoven with the Dutch context. In view of this, it is considered necessary to conclude this chapter with a description of the state of competence-based education in the Dutch context. Based on the experience of doing research in competence-based education, some elements of the situation in the Netherlands are discussed below.

Educational institutions for vocational education in the Netherlands are busy developing competence-based education. The Inspectorate of Education (2007) reported that about 30% of all study programmes (i.e. all MBO programmes) in the Netherlands started developing competence-based education in the form of 'experiments'. In 2009 (Van den Berg and De Bruijn, 2009) 40% of the MBO study programmes reported that they have not yet completed developing competence-based education. Study programmes that had the status of 'experiment' are not obliged to report to the Inspectorate the data and figures normally demanded of study programmes. This gives free rein to programmes to try out new forms of education. Without having the results (e.g. graduates and experiences with competence-based education) of those 'experiments', the government took the decision that every study programme in MBO had to use competencies as a starting point for their study programmes, with effect from 2011. Based on the experience of doing research in this field and on the ongoing discussions about the possible effects of competence-based education, it seems reasonable to suggest that it would have been better to first determine the added value of these 'experiments' before deciding whether competence-based education leads to the kind of innovation that seems necessary in vocational education. And whether it would lead to the desired results. With more patience on the policy side, a more deliberate decision could have been made. This would probably have led to less discussion and resistance that was dominating the introduction of competence-based education. Educational institutions and countries would do well to start working on competence-based education by means of pilots and wait for positive initial evaluations before implementing it on a larger scale. Of course,

scaling up an innovation is also difficult but with evidence that an innovation is effective, stakeholders could be convinced more easily. Practitioners in educational institutions have had to deal with several educational innovations in recent decades and this has made some of them resistant to change. Convincing results of pilots (i.e. experiments) would probably have made it easier to implement this innovation.

As shown earlier in this thesis, realising competence-based education at the educational institution level is complex and its implementation requires integrated management. In the Netherlands the decision was made to start realising competence-based education in all MBOs for life sciences education at the same time. At each MBO institution one or more study programmes participated in this national programme. Based on the experience reported in this thesis, it is fair to say that this has been very fruitful and effective. It has avoided institutions and study programmes having to find out 'how it works' for themselves. The communities of practices, organised on the basis of the content of study programmes (e.g. flowers, contracting), were very helpful to practitioners.

When competence-based education was introduced in the Netherlands, more was at stake than just the move towards competence-based education. Educational institutions had to save money and many mergers were necessary, which created large MBO institutions. This is the climate in which the move towards competence-based education has been taking place. The various developments were sometimes confused and occasionally this led to competence-based education being cast in a poor light. Naturally, educational innovations should be viewed critically but developments should not be mixed up.

One of the national newspapers in the Netherlands stated in March 2010 that, in general, directors of educational institutions and teachers are enthusiastic about competence-based education. Naturally, there are opponents, but generally the sentiment is positive. Whatever their standpoint, most practitioners complain about the pile of administration that accompanies the introduction of the competence-based qualification framework. On average a competence-based qualification profile is contained in about 100 pages of text. The competence-based qualification profiles consist of rather detailed descriptions of competencies and their relationships with contexts. The integration of competencies with contexts, which is an important characteristic of the holistic conceptualisation of competence, is guaranteed with describing these relationships. But it results in a long list of detailed descriptions containing the separate elements of competence. These lists have probably been drawn up for accountability purposes, but it does not do justice to the holistic character (i.e. integration of knowledge, skills and attitude) of competence. The Dutch competence-based qualification framework shows resemblances with NVQs in the UK (Mulder, Weigel and Collins, 2007) and competencies in Australia (Hager, 2004). Based on experience reported in this thesis, it is recommended that overspecification should be reduced. While they may assist the accounting, they make real competence development unnecessarily difficult; de-bureaucratization is necessary (see Mulder, 2001). It should be sufficient to mention which competencies are necessary for which tasks. There is no need to construct complete matrices with mechanistic descriptions of how competencies contribute to certain tasks.

Final word

Competence-based education is a promising educational innovation. Although it is not yet possible to measure its intended effects, it continues to be popular. This thesis clarifies what competence-based education entails, what it should look like and how it manifested itself in practice in the period 2004-2008. Going forward, research is needed into what does and does not work in competence-based education, into what does and does not lead to better learning and into the factors for the successful implementation of competence-based education. Based on the results of this thesis, it should be emphasised that integration is crucial to realising competence-based education. The integration of knowledge, skills and attitudes in the concept of competence, the integration of competencies with contexts to make meaningful constructs, the integration of the eight principles of CCBE and the integrated management needed to realise the implementation of competence-based education. All forms of integration should be seen as important conditions for making competence-based education work.

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Summary

Competence-based education is a popular educational innovation in vocational education. It aims, firstly, to prepare future professionals so that they will be able to perform properly and without too many teething problems in their future jobs and as participants in society as a whole (see Jenewein, Knauth and Zülch, 2002); and, secondly, to reduce the number of students leaving education before attaining their qualification. Competence-based education is an ambiguous concept. This is primarily because various conceptualisations of competence are in circulation (i.e. holistic, generic and behaviouristic) and because competence-based education is used as a catch-all term to refer to many forms of education (Van der Klink, Boon and Schlusmans, 2007). Despite the conceptual confusion, competence-based education is widely applied in educational practice. So how does it manifest itself in practice? The lack of an accepted definition leaves scope for practitioners (i.e. teachers) to claim they are working in a competence-based manner while continuing to work according to traditional principles. Conversely, practitioners whose work is actually based on competencies do not always recognise this or claim to work accordingly. Thus, besides conceptual clarity, clarity in practice is also needed.

In view of this, the aims of this thesis are twofold. The first aim is to conceptualise and operationalise competence-based education in which competencies are conceptualised from a holistic perspective. In this sense, holistic means the integration of knowledge, skills and attitudes in the concept of competence and the integration of competencies with contexts to make meaningful constructs relevant to the fulfilment of professional roles. The second aim is to investigate competence-based education. This is achieved with the help of the model that synthesised the underpinning characteristics of competence-based education. The intention here is to see how competence-based education manifests itself in educational practice. It is beyond the scope of this thesis to draw conclusions about the effects (i.e. labour market entry and student motivation) of competence-based education. Research that defines competence-based education and investigates what it should look like in practice is sorely lacking. Yet it is a precondition for further research into the impact of competence-based education on student learning, competence development and performance in the labour market. The research questions addressed in this thesis are:

1. What are the defining characteristics that should be adopted in a curriculum that aims to develop students' competencies (as seen from the perspective of the holistic conceptualisation of competence)?

2a. Are teachers and developers who are redesigning their curricula towards competence-based curricula able to work with a model that synthesises all the defining characteristics of competence-based education? 2b. To what extent do they think that working with such a model is useful?
3. To what extent is it possible to use a model that synthesises all the defining characteristics of competence-based education to investigate curricula-in-action that purport to be competence-based?
4. What roles and corresponding tasks can be identified for teachers who aim to realise competence-based curricula?
5. Do the defining characteristics of competence-based education provide footholds to improve the connectivity between learning in educational institutions and learning in the workplace?

Research question 1 and 2 relate to the first aim of this thesis. Research questions 3, 4 and 5 relate to the second aim. The research questions are explored in a number of studies conducted in vocational life sciences education (i.e. MBO and HBO) in the Netherlands in which various stakeholders of competence-based education participated. These groups were teachers, developers, students and workplace trainers. Except for chapter 2, in this chapter experts in the field of (competence-based) vocational education were consulted.

The lack of an accepted definition of the concept of competence-based education provided the starting point for the study reported in chapter 2. The main objective of the study was to clarify this concept, in which competencies are regarded from the perspective of the holistic conceptualisation (research question 1). The result of this study as described in chapter 2 is the model of comprehensive competence-based education (CCBE). This originated from a synthesis of various theoretical perspectives (e.g. social-constructivism, human resource development, workplace learning, total quality management) and was validated in a systematic way in cooperation with Dutch research experts and practitioners in the field of vocational education. The aim of this study was not only to come up with a set of defining characteristics, but also to construct a set of characteristics that was approved by research experts in the fields of both vocational education and competence-based education. By means of a focus group session and a Delphi study, the preliminary set of characteristics was reformulated; competence-based education was conceptualised by means of eight principles:

1. The competencies on which the programme is based are defined.
2. Vocational core problems are the organising unit for (re)designing the curriculum (learning and assessment).
3. The competence development of students is assessed before, during and after the learning process.
4. Learning activities take place in a range of authentic situations.
5. In learning and assessment processes, knowledge, skills and attitudes are integrated.
6. Self-responsibility and self-reflection/reflection is encouraged in students.

7. Teachers, in both school and professional practice, fulfil their roles as coach and expert equally.
8. A basis for students to achieve an attitude of lifelong learning is realised.

For each principle one to four underlying variables were identified, and on the basis of these variables the stages of realisation were defined (from 'not competence based' to 'completely competence based'). The principles are closely interrelated and concern both the instructional aspect (i.e. 3, 4, 6 and 7) and the content aspect (i.e. 1, 2, 5 and 8). It is the combination of the *what* (content) and the *how* (instruction) that defines competence-based education and warrants its label as comprehensive. By adding the adjective 'comprehensive', it is shown that the principles have to be dealt with in a comprehensive manner; this means all the principles are necessary and relevant if competence-based education is to be fully realised in the future.

Chapter 3 describes the extent to which the model of CCBE was understood and found useful by teachers and developers in educational practice (research question 2). Teachers and developers at one MBO institution were invited to use the model of CCBE in one of their team meetings to determine how competence based their curricula were. This team meeting was observed and followed by a structured group interview about the added value of working with the model. From the observation it appeared that teams were able to reach consensus internally, but it was not clear to what extent the interpretations of the different teams were comparable. Teachers and developers were very able to work with the model. It provided them with footholds for analysing in a clear way their current educational situation with regard to competence-based education. Based on the results of the group interviews, it can be reported that teachers and developers indicated that using the model empowered them to make clear choices and agreements concerning the (future) development of their study programmes and it provided them with clear arguments to explain their choices to their managers.

Ambiguity about the concept of competence offers practitioners the scope to replace existing labels (e.g. knowledge and skills) with more contemporary labels, such as competence, while changing very little in practice. This gives rise to the question of whether competence-based education is actually being realised and the extent to which educational practices in educational institutions are genuinely changing (research question 3)? Chapter 4 describes how the model of CCBE was used to construct a questionnaire and, in turn, this questionnaire was used to survey students and teachers on a large scale about the extent to which they perceived the CCBE principles in their curricula-in-action. Based on the results, it was concluded that the implementation of competence-based education in MBO and HBO is genuinely taking place and that the model offers a useful way of investigating this. MBO and HBO students alike and MBO and HBO teachers alike perceived the underpinning characteristics of competence-based education in their curricula-in-action. MBO students more so than their HBO counterparts. Repeated measurements showed that MBO students had a stable perception of the extent to which their education was competence based while HBO students' perceptions differed at the two measurement moments. The final conclusion

was that there were hardly any significant differences between students' perceptions and their teachers' perceptions.

Chapter 5 examines the implications for teachers of implementing competence-based education (research question 4). Educational institutions involved in implementing competence-based education (i.e. HBO and MBO) are engaged in a radical educational reform, one that has substantial implications for teachers (Descy and Tessaring, 2001; Seezink, 2009). Information from a diverse set of literature resources and relevant documents (i.e. job profiles) in combination with a large-scale teacher questionnaire and confirmatory factor analysis resulted in five teacher roles: expert, coach, researcher, developer and manager. Initially, the role of assessor was included in the list of roles. By the end of the study, however, the teachers did not considered it to be a discrete role. Tasks related to the assessor role were categorised as belonging to the roles of coach, developer and manager. The most traditional role of expert is considered to be the most important one and developer is defined as being the second most important. All five roles were perceived as more than averagely important for realising competence-based education. This indicates that working in competence-based education means job enrichment for teachers and consequently human resource departments of educational institutions should support teachers in developing themselves to fulfil their (new) role(s).

The introduction of competence-based education has increased the importance of learning in the workplace and has emphasised the importance of connectivity between learning in an educational setting and learning in the workplace. According to the connectivity theory of Griffiths and Guile (2003), connectivity between learning in the workplace and learning in an educational setting should be realised to provide the necessary support for students to become competent professionals. This raises the question of whether and how competence-based education can be used to improve this connectivity (research question 5)? Three principles of the model of CCBE were selected as the means for taking a closer look at connectivity issues and were used to interview groups in a systematic manner. These three principles addressed the instructional side of competence-based education (i.e. how to deliver competence-based education); in MBO the content side of competence-based education (i.e. competencies and vocational core problems) is already defined at a national level. Two MBO study programmes were examined as cases by means of group interviews with important stakeholder groups (students, teachers and workplace trainers). All stakeholders were convinced of the added value of learning in the workplace for competence development of students. The cases showed that connectivity was not being realised to its full extent because teachers and workplace trainers tended to interpret workplace learning as guided learning, whereas students saw workplace learning rather as experiential learning. Another problem with connectivity that was identified concerned the responsibility for the learning process in the workplace (see Poortman, 2007). As long as the various groups of stakeholders involved in workplace learning do not share the same expectations about responsibility, this remains a problem. This study illustrated that the three principles could offer footholds for analysing the connectivity between learning in school and learning in the

workplace. Such analysis alone, however, cannot bring about an improvement in connectivity.

Chapter 7 combines the findings of the studies and reflects on the aims of this thesis. The first aim is to conceptualise and operationalise competence-based education. By means of a model of CCBE, competence-based education is conceptualised (principles) and operationalised (stages of realisation). The second aim is to study how competence-based education manifests itself in practice. With the help of the model of CCBE it was possible to analyse and describe competence-based education in practice. This led to some valuable insights (i.e. perceptions, teacher roles, connectivity) into current educational practice. Based on all the findings, it should be emphasised that integration is crucial to realising competence-based education. The integration of knowledge, skills and attitudes in the concept of competence, the integration of competencies with contexts to make meaningful constructs, the integration of the eight principles of CCBE and the integrated management of the implementation of competence-based education. All forms of integration should be seen as important conditions for making competence-based education work. At the end of chapter 7, a number of practical implications and issues for future research are described that will foster the development and optimisation of competence-based education, enabling it, in time, to meet its goals of labour market entry and student motivation.

Samenvatting

Het gebruik van competenties als startpunt voor het vormgeven van beroepsonderwijs is een trend in Nederland en vele andere landen in Europa en daarbuiten en kent twee belangrijke doelstellingen. De eerste doelstelling betreft het beter voorbereiden van afgestudeerden op de huidige maatschappij en op hun start op de arbeidsmarkt (zie Jenewein, Knauth, en Zulich, 2002). De tweede doelstelling van competentiegericht beroepsonderwijs is het terugdringen van de vroegtijdige uitval van leerlingen en studenten. Competentiegericht beroepsonderwijs beoogt het onderwijs aantrekkelijker te maken en dit zou tot gevolg hebben dat leerlingen en studenten minder snel school verlaten zonder diploma. Kortom, competentiegericht beroepsonderwijs is een ambitieus concept, maar tegelijkertijd roept het veel verwarring op. Deze verwarring komt hoofdzakelijk doordat er verschillende betekenissen en interpretaties van het concept competenties in omloop zijn (bijvoorbeeld holistisch, generiek of behavioristisch). Dit heeft er vervolgens toe geleid dat vele vormen van (vernieuwend) onderwijs onder het concept competentiegericht beroepsonderwijs zijn geschaard (Van der Klink, Boon en Schlusmans, 2007) met alle onduidelijkheid van dien. Het gevaar van een verwarrende definitie is dat docenten en ontwikkelaars claimen dat ze competentiegericht beroepsonderwijs aanbieden, zonder dat er daadwerkelijk iets veranderd in hun onderwijspraktijk. Maar het tegenovergestelde kan ook het geval zijn: docenten en ontwikkelaars zijn zeer competentiegericht bezig, maar noemen het zelf niet zo. Ondanks deze onduidelijkheid is het competentiegericht beroepsonderwijs een trend en in sommige landen, waaronder Nederland, zelfs een verplichting (in het MBO). Het is derhalve van belang dat wordt vastgesteld wat competentiegericht beroepsonderwijs precies is en hoe het vorm krijgt in de praktijk.

De doelstelling van dit proefschrift is dan ook tweeledig. Het eerste doel is het definiëren en operationaliseren van het concept competentiegericht waarbij competenties vanuit een holistische conceptualisatie als uitgangspunt zijn genomen. In dit verband betekent holistisch ten eerste de integratie van kennis, vaardigheden en houding in het concept competentie. Ten tweede betekent holistisch dat een competentie alleen betekenis krijgt in een bepaalde context. Als een competentie niet in een bepaalde context wordt ontwikkeld of beoordeeld dan is een competentie geen betekenisvol construct; het blijft dan veelal te algemeen en heeft voor een leerling of student geen betekenis. Het tweede doel van dit proefschrift is het onderzoeken van competentiegericht beroepsonderwijs in de praktijk. Het model dat als resultante uit het onderzoek in het kader van het eerste doel naar voren is

gekomen is als uitgangspunt genomen voor het onderzoek om te kijken hoe competentiegericht beroepsonderwijs vorm krijgt in de onderwijspraktijk.

Het valt buiten de scope van dit proefschrift om conclusies te trekken over de effecten van competentiegericht beroepsonderwijs (zoals aansluiting op de arbeidsmarkt en reductie van uitval). Echter onderzoek dat vaststelt wat onder competentiegericht beroepsonderwijs wordt verstaan en hoe het zich manifesteert in de onderwijspraktijk ontbreekt tot op heden grotendeels. Het is de rationale achter dit proefschrift dat het vaststellen van wat competentiegericht beroepsonderwijs is en hoe het vorm krijgt in de onderwijspraktijk voorwaardelijk is voor het doen van onderzoek naar de effecten ervan. De volgende onderzoeksvragen staan dan ook centraal in dit proefschrift:

1. Wat zijn bepalende ontwerpprincipes die moeten worden gehanteerd in een curriculum dat competentieontwikkeling als doel heeft en waarin competenties vanuit het holistische perspectief worden gezien?

2a. In hoeverre is het model dat de bepalende kenmerken van competentiegericht beroepsonderwijs samenvat begrijpelijk en bruikbaar voor docenten en ontwikkelaars van competentiegerichte curricula? 2b. En in hoeverre denken zij dat werken met een dergelijk model toegevoegde waarde heeft?

3. In hoeverre is het mogelijk om met het model dat de bepalende kenmerken van competentiegericht beroepsonderwijs samenvat, de mate van competentiegerichtheid van curricula-in-actie in MBO en HBO te onderzoeken?

4. Welke rollen en taken kunnen worden vastgesteld voor docenten die competentiegerichte curricula vormgeven en uitvoeren?

5. Bieden de bepalende kenmerken van competentiegericht beroepsonderwijs handvatten om de verbinding tussen leren in school en leren in de beroepspraktijk te verbeteren?

Onderzoeksvragen 1 en 2 komen voort uit het eerste doel van dit proefschrift en onderzoeksvragen 3, 4 en 5 hebben een relatie met de tweede doelstelling. De onderzoeksvragen zijn onderzocht in een vijftal studies die hebben plaatsgevonden in het MBO en HBO in het agrarische onderwijs in Nederland. Met uitzondering van hoofdstuk 2, zijn in de verschillende studies naast studenten en docenten ook werkplekbegeleiders onderwerp van onderzoek geweest. In hoofdstuk 2 zijn experts op het gebied van beroepsonderwijs en/of competentiegericht beroepsonderwijs geraadpleegd.

Het ontbreken van een breed gedragen definitie van het concept competentiegericht beroepsonderwijs is het startpunt van het onderzoek waarover in hoofdstuk 2 van dit proefschrift wordt gerapporteerd. Het belangrijkste doel van deze studie is het definiëren van het concept competentiegericht beroepsonderwijs (onderzoeksvraag 1). Het definiëren heeft op twee wijzen plaatsgevonden. Ten eerste door het concept nader uit te werken en ten tweede door het concept te operationaliseren. Voor het conceptualiseren van competentiegericht beroepsonderwijs is gebruik gemaakt van literatuur en theorie uit verschillende (wetenschaps)gebieden waar competenties een rol spelen. Een synthese van inzichten uit het sociaal-constructivisme, human resource development, werkplekleren en

kwaliteitsmanagement heeft geresulteerd in een set ontwerpprincipes. Naar het idee van kwaliteitsmodellen (bijvoorbeeld TQM of INK) zijn deze principes verder uitgewerkt in vier ontwikkelingsfasen. Het uiteindelijke resultaat is een concept-matrix. Deze is vervolgens voorgelegd aan een groep experts op het terrein van beroepsonderwijs en/of competentiegericht beroepsonderwijs. In een focusgroepbijeenkomst en een Delphi-studie hebben 15 experts naar de matrix gekeken en deze op een systematische wijze gezamenlijk verder ontwikkeld en gevalideerd. Het resultaat van dit onderzoek is de matrix voor competentiegericht beroepsonderwijs. De matrix bestaat uit acht principes en die luiden als volgt:

1. De competenties die in de opleiding centraal staan zijn bepaald.
2. Kenmerkende (beroeps)situaties zijn het organiserende principe voor het (her)ontwerp van het onderwijs (leren en beoordelen).
3. De competentieontwikkeling van de deelnemers wordt op regelmatige basis (voor, tijdens en na het leerproces) beoordeeld.
4. De leeractiviteiten vinden plaats in meerdere authentieke situaties.
5. Kennis, vaardigheden en houding komen in het leer- en beoordelingsproces geïntegreerd aan bod.
6. Zelfverantwoordelijkheid en (zelf)reflectie van de deelnemers worden bevorderd.
7. De docenten en praktijkbegeleiders van de deelnemers vervullen hun rollen als coach en expert in evenwicht.
8. Er wordt een basis voor competentieontwikkeling gedurende de verdere loopbaan gerealiseerd.

Ieder principe is vervolgens nader gedefinieerd aan de hand van onderliggende variabelen (bijvoorbeeld 'integratie van kennis, vaardigheden en houding' bij principe 5 of 'leervragen van de deelnemer' bij principe 6). Op basis van deze variabelen zijn voor ieder principe de verschillende ontwikkelingsfasen concreet ingevuld. De fasen zijn als volgt te karakteriseren: niet competentiegericht, startend competentiegericht, gedeeltelijk competentiegericht en volledig competentiegericht. In de niet competentiegerichte fase staat kennisoverdracht (ook wel traditioneel onderwijs genoemd) centraal. In de laatste fase worden competenties en kenmerkende beroepssituaties als uitgangspunten voor het ontwikkelen van het curriculum genomen. De ontwerpprincipes van de matrix hangen nauw met elkaar samen en omvatten zowel het *wat* (inhoud; principe 1, 2, 5 en 8) van het onderwijs als het *hoe* (instructie; principe 3, 4, 6 en 7) van het onderwijs. Hoewel de principes afzonderlijk niet uniek zijn, is de combinatie wel uniek. Het is de combinatie van deze aspecten die bepaalt in hoeverre een curriculum kan worden getypeerd als competentiegericht en de ontwikkeling hiervan stuurt: alle principes zijn noodzakelijk en relevant om competentiegericht beroepsonderwijs vorm te geven. Om deze conclusie te onderstrepen, is er voor gekozen om de toevoeging

comprehensive[6] aan de matrix voor competentiegericht beroepsonderwijs toe te voegen. Het resultaat van deze studie is de matrix voor comprehensive competentiegericht beroepsonderwijs (CCGO).

In hoofdstuk 3 wordt een onderzoek beschreven waarin is nagegaan of de matrix voor CCGO begrijpelijk is voor docenten en ontwikkelaars in de onderwijspraktijk en in hoeverre zij de matrix bruikbaar en zinvol vinden. Om de tweede onderzoeksvraag van dit proefschrift te beantwoorden, zijn docenten en ontwikkelaars uit 12 teams van één MBO uitgenodigd om met behulp van de matrix voor CCGO hun eigen onderwijs te positioneren in de matrix en te bekijken naar welke ontwikkelingsfase ze zouden willen doorgroeien. Deze bijeenkomsten zijn op een systematische wijze geobserveerd en naderhand zijn de teams ondervraagd met behulp van een standaard set van vragen. Uit de observaties blijkt dat de teams goed kunnen werken met de matrix. De matrix biedt hen handvatten om in het team consensus te bereiken over waar ze staan en waar ze heen willen. De teams bereiken intern consensus, maar het blijft onduidelijk in hoeverre de verschillende teams de matrix op een zelfde wijze interpreteerden. De teams geven aan dat het gebruik van de matrix hen in staat stelt om heldere keuzes en afspraken te maken waar ze heen willen met hun onderwijsprogramma's. Tevens biedt de matrix hen argumenten om hun keuzes te verantwoorden richting managers.

Van der Klink en Boon (2003) tonen aan dat het ambigue karakter van het concept competentiegericht onderwijs kan leiden tot 'window dressing'. Dat wil zeggen dat scholen zeggen hun onderwijs competentiegericht vorm te geven, terwijl er in de praktijk niet veel verandert en dit roept de vraag op in hoeverre competentiegericht beroepsonderwijs daadwerkelijk vorm krijgt in de onderwijspraktijk en in hoeverre de onderwijspraktijk echt aan het veranderen is (onderzoeksvraag 3). In hoofdstuk 4 wordt omschreven hoe op basis van de matrix voor CCGO een vragenlijst is ontwikkeld om curricula-in-actie te onderzoeken in verschillende scholen voor MBO en HBO. Deze vragenlijst is op grote schaal verspreid onder studenten en docenten en betrokkenen zijn bevraagd in hoeverre zij de principes van de matrix voor CCGO ervaren in hun dagelijkse onderwijspraktijk. Op basis van de resultaten kan worden geconcludeerd dat de implementatie van competentiegericht beroepsonderwijs daadwerkelijk plaatsvindt in MBO en HBO. MBO- en HBO-docenten en studenten percipiëren in meer of mindere mate de aanwezigheid van de acht principes in hun onderwijs. MBO-studenten percipiëren de principes in hogere mate dan HBO-studenten en laten over een tijdsbestek van zes maanden ook een stabieler beeld zien. Laatste belangrijke conclusie is dat er nauwelijks significante verschillen zijn geconstateerd tussen de percepties van studenten en docenten.

Het realiseren van competentiegericht beroepsonderwijs heeft grote gevolgen voor de taken van de docenten (Descy en Tessaring, 2001; Seezink, 2009). Op basis van een diverse set van (wetenschappelijke) bronnen (bijvoorbeeld bestaande beroepsprofielen van docenten) in

[6] Er is geen goede Nederlandse vertaling van het woord comprehensive. Comprehensive kan worden samengevat in twee Nederlandse woorden: samenhangend en allesomvattend. Er is voor gekozen om ook in de Nederlandse samenvatting te spreken van comprehensive.

combinatie met een vragenlijst en betrouwbaarheidsanalyses kan worden geconcludeerd dat docenten vijf rollen belangrijk vinden bij het vormgeven en verzorgen van competentiegericht beroepsonderwijs: expert, coach, onderzoeker, ontwikkelaar en manager. In eerste instantie was ook de rol van assessor opgenomen in het beroepsprofiel. Op basis van de resultaten van de studie kan worden geconcludeerd dat de docenten de rol van de assessor niet als aparte rol zien. De taken die onder de rol van assessor waren ondergebracht worden gezien als coachings-, ontwikkelings- of managertaken. De meest traditionele rol van expert wordt als belangrijkste rol aangeduid en de ontwikkelaarsrol is de op één na belangrijkste in de ogen van de docenten. Echter, docenten vinden alle vijf de rollen meer dan gemiddeld van belang en de rollen zouden moeten worden ingevuld binnen één team. Dit betekent dat docenten meerdere rollen zouden moeten gaan vervullen of moeten kunnen kiezen welke rol(len) ze willen gaan vervullen in hun team. De human resource afdelingen van onderwijsorganisaties zouden de docenten ondersteuning moeten bieden bij het kiezen van één of meer rollen (hangt af van de grootte van het team) en het ontwikkelen van deze (nieuwe) rollen.

Door de introductie van competentiegericht beroepsonderwijs is het belang van werkplekleren sterk toegenomen en dien ten gevolge krijgt het realiseren van een goede verbinding tussen leren op de werkplek en leren in school veel aandacht. Volgens de verbindingstheorie van Griffiths en Guile (2003) moet verbinding tussen leren op de werkplek en leren in de school goed worden georganiseerd om de studenten op een adequate wijze te ondersteunen zich te ontwikkelen tot competente professionals. Eerder onderzoek laat echter zien dat deze verbinding niet automatisch ontstaat en vaak zelfs problematisch is. Deze constatering leidt tot de vraag of en hoe de principes van de matrix voor CCGO kunnen bijdragen aan het verbeteren van de verbinding tussen leren op de werkplek en leren in de school (onderzoeksvraag 5). In hoofdstuk 6 wordt omschreven hoe drie principes van de matrix voor CCGO zijn geselecteerd op basis waarvan een semi-gestructureerd interviewschema is opgesteld om studenten, docenten en werkplekbegeleiders te ondervragen over hoe zij het leren in authentieke situaties vinden en hoe zij hun eigen rol hierin zien. Er is gekozen om de instructie-gerelateerde principes (principe 4 authentieke situaties; principe 6 zelfverantwoordelijkheid van de student en principe 7 de rol van expert en coach) met uitzondering van principe 3 (assessment) als uitgangspunt te nemen om de verbinding te onderzoeken, omdat dit onderzoek zich richt op het verbinden van het leren. Het verbinden van beoordelen betreft een ander vraagstuk. En in het MBO, waar dit onderzoek heeft plaatsgevonden, is de inhoud van het curriculum al grotendeels bepaald door de (competentiegerichte) kwalificatiestructuur en daarom zijn de inhoudsgerelateerde principes (1, 2, 5 en 8) voor dit onderzoek buiten beschouwing gelaten. Twee opleidingen golden als casus in dit onderzoek en de betrokkenen zijn bevraagd in groepsinterviews. Alle betrokkenen zijn overtuigd van de toegevoegde waarde van leren op de werkplek. De studieprogramma's laten zien dat de verbinding tussen leren op de werkplek en leren in school niet optimaal wordt vormgegeven. Docenten en werkplekbegeleiders zien het leren op de werkplek als begeleid leren, terwijl studenten het leren op de werkplek als 'leren-door-doen' zien. Een ander knelpunt is het verschil van mening over wie er verantwoordelijk is

voor het leerproces (zie ook Poortman, 2007). Zo lang de betrokken partijen geen eenduidig beeld hebben over wie er verantwoordelijk is voor het leerproces, blijft het verbinden van het leren op de werkplek en het leren in de school problematisch. De resultaten van deze studie laten zien dat de drie gekozen principes van de matrix voor CCGO handvatten bieden om inzicht te krijgen in de verbinding tussen leren in en buiten de school, maar dat dit inzicht alleen geen verbetering teweeg brengt.

Tot slot worden in hoofdstuk 7 de resultaten van de verschillende studies samengevat en wordt er teruggekeken naar de doelstellingen van dit proefschrift. Het eerste doel betreft het conceptualiseren en operationaliseren van het concept competentiegericht beroepsonderwijs. De matrix voor CCGO conceptualiseert competentiegericht beroepsonderwijs door het benoemen van ontwerpprincipes en operationaliseert deze door het vaststellen van verschillende ontwikkelingsfasen. Het tweede doel betreft het onderzoeken hoe competentiegericht beroepsonderwijs zich manifesteert in de onderwijspraktijk. De matrix voor CCGO maakt het mogelijk om de onderwijspraktijk te analyseren en beschrijven en dit leidt tot enkele waardevolle inzichten (met betrekking tot percepties van studenten en docenten, docentrollen en verbinding tussen leren op de werkplek en leren in de school). Alle resultaten in ogenschouw nemend kan worden geconcludeerd dat integratie cruciaal is als het gaat om het realiseren van competentiegericht beroepsonderwijs. Integratie van kennis, vaardigheden en houding, integratie van competenties met contexten, integratie van de acht ontwerpprincipes van de matrix van CCGO en het integraal samenwerken van management en docenten in scholen om competentiegericht beroepsonderwijs te realiseren. Alle vormen van integratie moeten worden gezien als belangrijke randvoorwaarden om competentiegericht beroepsonderwijs daadwerkelijk te laten slagen. Tot slot wordt in hoofdstuk 7 een aantal praktische implicaties geformuleerd en onderwerpen voor toekomstig onderzoek omschreven. Dit kan de verdere ontwikkeling van competentiegericht beroepsonderwijs stimuleren om uiteindelijk uitspraken te kunnen doen over het al dan niet behalen van de doelstellingen van competentiegericht beroepsonderwijs.

About the author

Renate Wesselink was born 13 November 1976 in Zelhem, the Netherlands. She studied Educational Science and Technology at the University of Twente. Her master thesis, conducted at ABN AMRO Bank N.V. in Amsterdam, concerned the evaluation of a competence assessment instrument that assessed the competencies of employees and gave them input for an individual development trajectory. After graduation in 2000, she started working as a researcher at the current Education and Competence Studies Group of Wageningen University. While working on various projects and delivering courses in the area of human resources, she completed her thesis. At present Renate is an assistant professor providing courses in the field of career development, human resource development and human resource management. Examples of key research areas involve, besides (competence-based) vocational education, the construction of competence profiles, investigating human resources to contribute to sustainability and the professional development of teachers in vocational education.

Key publications

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Name of the course	Department/ Institute	Year	ECTS[7]
I. General part			
Teaching and supervising thesis students	Educational Staff development group	2005	1
Research methodology: designing and conducting a PhD research project	MG3S	2005	2.8
Research meetings ECS		2005-2010	4
II. Mansholt-specific part			
Mansholt introduction course	MG3S	2007	1.5
Mansholt multidisciplinary seminar	MG3S	2008	1
"Using an instrument to diagnose competence-based curricula; experiences of teachers in Dutch VET"	American Educational Research Association, Chicago, VS	2007	2
"Roles of teachers in competence-based education"	European Conference Educational Research	2004	2
"Matrix voor competentiegericht beroepsonderwijs"	Onderwijs Research Dagen	2005	1
"Learning infrastructures in SME's"	European Association for Research on Learning and Instruction	2008	2
III. Discipline-specific part			
Writing research proposal			6
Quantitative research methods	MG3S	2006/7	4
Study visit 'Training in the banking and financial sector'	CEDEFOP	2004	1.5
Skillsnet workshop 'Innovative agri-food and forestry-wood chains'	CEDEFOP	2006	1.5
International seminar 'Measuring the responsiveness of vocational qualifications to innovation'	University of Oxford	2007	1.5
Theories and tools of narrative inquiry	MG3S	2008	1.4
Assessment en testinterpretatie	Meurs		0.5
IV. Teaching and supervising activities		2005-2010	4
TOTAL (min. 30 ECTS)			37.7

[7] One ECTS on average is equivalent to 28 hours of course work

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136