Competences and vocational higher education: Now and in future

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SUMMARY

In this article the popularity of the concept of competence in higher vocational education is explained and the most important issues in this field are discussed. In particular, the vagueness of the term and the problems in defining job and training profiles are explained. Then the design of competence-based education is discussed. The paper ends by mentioning some subjects that are relevant to the future of competence-based education.

Competence-based education is a catch-all word concealing many different forms of education. It is mostly used for individual courses and much less for curricula although, seen from the point of view of competence, this could be the most interesting level. Research into the effectiveness – and content – of competence-based education is sparse and it is important to subject the claims of competence-based advocates to further investigation.

Key words
Higher education, innovation, competences, instructional design

1. Background to the popularity of the term competence

Competence is a term that has caused a furore within a relatively short time. Many recent books and articles on educational theory devote attention to competences, core competences and competence-based education, incidentally often without making it clear what the term means precisely (Biemans et al., 2004, Mulder, 2000, Descy and Tessaring, 2001).

This paper goes into the use of the concept of competence in the context of Dutch vocational higher education and discusses a number of central problems, although it should be noted that the problems presented here are not unique to higher vocational education, but are also relevant to secondary vocational education. Furthermore, the problems presented here can be seen in other countries of the European Union.

It is noteworthy that thinking in terms of competences is often presented as a new philosophy of teaching and training, whereas the term competence was already particularly popular in the 1970s. At that time, experiments were launched in the United States with competence-based curricula. Teacher training in particular, under the name Competence-Based Teacher Training (CBTT), but also legal and nursing vocational training, was also reorganised on a competence-based model (Grant, 1979). These experiments must be seen in the light of the problem of articulation observed between education and professional practice. The idea behind the experiments was that more stress had to be put on the acquisition of essential knowledge and skills under the slogan 'Back to basics'. Specific to CBTT was the emphasis on the acquisition of the behaviour exhibited by outstanding teachers by the study of part-skills, using heavily behaviouristically slanted instruction methods such as micro-teaching.

The initial optimism over CBTT ebbed very quickly (see Eraut, 1994). The copying of the behaviour of outstanding teachers by studying skills or part-skills did not result in the broad competence intended. Students encountered problems in integrating the part-skills learned, an ability that is required to function properly as a teacher. Although the American experiments attracted some notice, the CBTT approach attracted only a small following.

Not until the early 1990s did competence thinking attract widescale interest. Mulder (2000) assumes that interest in this concept was generated by publications on core competences by Prahalad and Hamel (1990). The concept first became popular in labour organisations and vocational education. Not until the end of the 1990s did higher education begin to show a serious interest in competence thinking. Interest in the concept of competence cannot be ascribed to any one development; rather it was a cluster of developments that led higher educational institutions to embrace the concept of competence. A few of these developments are described briefly below.

A feature of contemporary work is the increasing unpredictability of the future and the accompanying uncertainty over the skills that, both qualitatively and quantitatively, are important. More flexible work is the answer given by labour organisations to overcome this uncertainty. Traditional careers, in which employees work for prolonged periods for the same employer, building a vertical career, are on the decline; employees more often face, whether willingly or not, changes of employment so a horizontal career pattern is becoming ever more common. The ability to manage one's own career, even if it is much more often a more horizontal career,

is a skill that contributes to whether an employee is a successful 'knowledge worker' in the lowest segments of the labour market (Kuijpers, 2003). A knowledge worker is someone who acts efficiently, anticipates and learns and who uses knowledge for improvement and renewal. The development and application of knowledge in products and services - and, furthermore, at a faster rate than competitors - is vitally important to labour organisations for them to survive in the 21st century (Kessels, 2004). Possession of the ability and motivation to keep learning is crucial for a labour organisation to continue to be attractive.

It should be obvious that these changes in work have repercussions for higher education. Besides professional skills, graduates are expected to have learning, social and career competences in order to guarantee wide employability, including in the longer term. These competences are an essential part of the skills of employees in a post-industrial society and must therefore be given adequate consideration in syllabuses of higher education.

It would not be doing justice to reality simply to pay lip service to the concept of competence by pointing out external developments, such as the labour market situation or government policy. In higher educational institutions, too, one can see trends that form a breeding ground for thinking in terms of competences. The idea that reality is becoming more complex and dynamic has increased understanding in higher education that the acquisition of predominantly technical knowledge is not enough to manage the increasing complexity. A switch is taking place from knowledge to learning. In addition, the results of experiments in educational psychology in the 1980s show that the transfer of knowledge and skills does not take place automatically (see e.g. Salomon and Perkins 1989), and subjects such as 'Learning to learn', 'Project education', 'Problem-centred education' and 'Contextualisation and decontextualisation' score higher on the innovation agenda of higher education.

The move from knowledge to learning, in combination with the problem of transfer, creates a seed bed for the concept of competence. Whereas problem-centred or project education emphasises teaching methods for the collective learning of how to solve problems, competence-based education stresses the nature of the problems which must be included in such forms of education, namely the key content of professional practice. Key content means the problems and tasks that belong to the durable core of the profession and which are fairly stable over time.

2. Consideration of competences in higher education

The fact that competence thinking is extremely popular does not mean that it means the same thing in every context. Different views are possible and each view gives a slightly different facet of the term competence. A num-

ber of these views are dealt with by Van der Klink and Boon (2003), and these are briefly described in Table 1. Competence is an international term but its meaning is different in different countries. Table 1 shows how the concept of competence is defined in the three countries where the term is frequently used. A second view of the concept of competence is the educational theoretical perspective. In the table a distinction is drawn between the cognitive theory of learning and the constructivist theory of learning that has been in vogue particularly over the past 10 years. Lastly the table describes the view from the area of application since the purpose for which the concept of competence is used determines the nuances of the definition. For instance, in educational settings definitions are used in which competences are regard-

Table 1: Views of the concept of competence

View	Location	Emphases in the definition
Geographical area	United States	Competence [American: competency] refers to behavioural and personality characteristics underlying possibly excellent performance.
	United Kingdom	Competence refers to the ability to perform to standards specified in advance.
	Germany	Competence refers to the broad capacity to act that enables an individual to do a job. Aspects such as interpretation and professional identity are also part of this capacity.
Teaching theory	Constructivism	Emphasises the importance of convictions, motivation and ambition as major aspects of the term competence, more stress on involvement of participants in developing teaching practices based on competence.
	Cognitive teaching theory	Stronger accent on teachable aspects of competence, more emphasis on top-down approach to the development of teaching practices based on competences.
Practice	Acquisition and selection	Competences consist of a combination of partly developable potentials and partly non- or hardly changeable personal characteristics for a range of jobs.
	Teaching and training	Competences are regarded as something to be learned or to be developed further.
	Job evaluation	Competences are defined in terms of specific actions within one job.
	Performance pay	Competences are defined in terms of the desired output of a job. Competence is regarded as the predictor of performance.

ed as developable skills, whereas in selection practice competences are much more often regarded as hard or unvarying personal characteristics.

There is no good overview of the extent to which the concept of competence has been embraced in higher education but it is a fact that much attention is devoted in higher educational institutions to the competences of their graduates. The particular feature of this development is the fact that the attention comes above all from the institutions themselves, in contrast to the 1970s, when the concern came from employers regarding the connection between education and the labour market. Various developments support the interest that training institutions have in the professional abilities or competence of graduates. One of these is the accreditation system, in which the aptitude of graduates for the labour market is used as an explicit quality criterion both for higher vocational and higher education graduates. Another development supporting competence thinking is certainly the interest that educational institutions have in a good reputation in this field since, as resources become more scarce and competition increases in the higher education market, reputation and recognition are extremely important assets.

Despite this attention there is also a considerable lack of clarity about the precise definition of relevant competences. Which competences must graduates have? What is the relative importance of various types of knowledge, skills and attitudes? Does this relative importance change in the course of a career? Which labour market perspective must education prepare for? And which time perspective is important? Which are more important, competences needed at the time of the first entry to the labour market or competences that are important at the later stages of a career?

The eagerness of educational institutions to offer competence-based training, in combination with the lack of clarity about the precise content of the concept 'competence-based' has led to the multiplicity of different meanings and forms of implementation that we find in higher education.

In higher education the term 'competence-based education' is often used without it always being clear what it means exactly. Van der Klink and Boon (2003) observe that four variants are actually used. In the first variant it is above all a matter of window dressing; the term is used by education providers to create a distinct profile on the market without anything actually changing in the education. It could be called 'old wine in new bottles'. Here it is often a case of a different name for an existing education in skills where the extra ingredient is on the surface.

In the second variant the term 'competence-based education' can be used if there is an innovation in the teaching methods, moving towards integration of knowledge and skills, often by the use of authentic problems, projects or cases. The authentic problems discussed in training are not chosen for their representativeness or relevance to the practice of the profession but from the pedagogic perspective of identifiability. In practice the emphasis here is often on vocational skills.

Third, competence-based education can aim at strengthening the re-

lationship with the possibly regional labour market, for instance by setting up consultative committees with representatives from the professional field, staff training, or by drawing up job or training profiles in consultation with the professional field. This variant occurs particularly in training courses to prepare for a profession with a recognisable profile and a well-organised professional field.

The fourth and last variant uses competence-based education as a label for an integrated approach, in which attention is devoted both to pedagogic innovation and optimisation of the relationship with the labour market (see also Buskermolen and Slotman, 1999). This approach is discussed further in paragraph 4.3.

The four variants described above are meant as a structural framework for educational practices and are definitely not intended to make judgments in the form of more/less, better/worse. Furthermore, the variants do not in principle rule each other out. For instance, window dressing can act as a prelude to making real innovations in education.

3. The arrangement of competence-based higher education

Institutions that begin introducing competence-based education encounter a number of problems:

1) There is little agreement on the definition of competence so that a shared vision on how to introduce competence-based education is often missing.
2) A fundamental condition for introducing competence-based education is the possession of a job and training profile so that the demands made on graduates match the competences demanded on the labour market.
3) There is a considerable lack of clarity in the way in which and the methods by which competence-based education has to be designed and arranged.

The following paragraphs discuss these three problem areas in detail.

3.1 Definition of competences

Van der Klink and Boon (2003) argue that the lack of clarity over the term competence itself contributes to its popularity. On the basis of interviews with experts, the authors observe that competences include at least knowledge, skills and attitudes, and that the mix of these can vary with each competence. In their opinion, conceptual harmonisation is a necessary precondition. They also advocate limiting the term competence-based education by applying the following two criteria:

1) Competences dealt with in training must be geared to the requirements (key problems) in the profession/cluster of jobs for which the training is a qualification.

2) The teaching (and testing) methods must prepare the student to handle these key problems.

The number of definitions of the term competence is probably incalculable. On the basis of a literature study, Stoof, Martens and Van Merriënboer (2000) observe that competence is a term that belongs to the 'wicked words' category. A characteristic of wicked words is that their limits are difficult to determine. Complete agreement on the content of a term like this is virtually impossible.

- A study was conducted by Van Merriënboer, Van der Klink and Hendriks (2002) on behalf of the Advisory Council for Education into the possibility of a conceptual harmonisation of the concept of competence.

The authors observe that there is a considerable overlap between the concept of competence and concepts such as 'expertise' and 'key qualification', but the concept of competence is not entirely covered by the other concepts. The authors come to the conclusion that conceptual harmonisation of the concept of competence is possible using six dimensions, three of which are considered necessary and three relevant. The idea of dimensions suggests that several positions can be held on one dimension (e.g. low, neutral, high). In view of the limited length of this text, only the necessary dimensions are dealt with here:

- Integrativity: a competence is a coherent assembly of elements needed for problem-solving;
- Sustainability: one characteristic of a competence is that it is fairly stable (over time) but that the content (e.g. the knowledge and skills) of the competence varies over time;
- Specificity: competences differ in the degree to which they are context-bound. Some, such as learning competences, are widely applicable whereas others are more bound to specific contexts, including vocational.

Finally the authors point out that conceptual harmonisation is perhaps important but only if it is regarded as a necessary step towards educational innovation. A correct balance must be struck between conceptual harmonisation, on the one hand, and actually working at educational innovation by the parties concerned, on the other.

3.2 Job and training profiles

One of the pillars of a competence-based approach to education is the match between the content and the skills demanded by business. It is clear that a mix of specific professional competences must be sought which ensure usability in the short term, and broader competences that guarantee employability in the longer term (Borghans and de Grip, 1999). There are various methods for harmonising professional demands with educational curricula.

In broad outline a distinction must be drawn between methods that attempt to make a direct link between professional practice and education-

al curricula and methods intended to distil the elements of professional practice that can enrich the curriculum.

In the first variant there is a strong emphasis on the analysis of knowledge and skills needed to do a job and then on translation of this knowledge and these skills into educational terms. Normally it is almost always the job of experts to reflect on essential competences belonging to a specific job or task. Their ideas are then used as input for a curriculum. The best-known method is conventional task and job analysis, in which tasks, sub-tasks and goals are identified by the use of observation and interviews. Variants of the task and job analysis are the critical path and critical incident analysis (Fletcher, 1997), which both aim at a very specific description of tasks, based on interviews with professionals. A second variant is more focused on designing a curriculum that meets the demands of a job or profession; the focus here is on enrichment of the curriculum. The goal is not to make a direct match with the job requirements but to distil the realistic and representative characteristics, requirements or situations from professional practice that make it possible to integrate competences into the training. These competences must be relevant to professional practice but must at the same time make it possible to innovate the professional practice. A number of methods used in this connection are: research into the professional experiences of alumni of a particular training programme and then specifically to question the degree to which the training offers a good preparation for the profession concerned. Other methods are based on group surveys of experts at a working conference. One example is the Dacum method (developing a curriculum), which provides an analysis of tasks, knowledge and skills needed to practise a profession. The analysis is then made according to a specific procedure by a panel of practitioners of that profession. The most important assumptions are that expert practitioners are better at describing a profession than anyone else; that each profession can be broken down into jobs and tasks and, lastly, that all tasks have implications for the knowledge and skills required. Possibly the Dacum method can be further explored in subsequent stages such as the AMOD method (a model), in which a step is taken towards curriculum and evaluation, or the SCID (Systematic Curricular Instructional Development), in which a detailed analysis of tasks is made with a view to curriculum development.

Other methods are surveys of core competences or key qualifications where quantitative and qualitative information is sought by using interviews, questionnaires and a seminar, with the object of describing those competences that demand flexibility from practitioners (Van Zolingen, 1995; Onstenk, 1997). The important point here is consideration for the complexity of relationships between the expected output, the organisational setting and the social context in which the work is being done. Another qualitative method for drawing up job profiles in both the short and long term was tested by van der Klink and Boon (2002). Using semi-structured interviews with recent graduates and their direct supervisors, they investigated what com-

petences are needed for today's professional practice and for careers within these practices.

In practice, the choice of method is dictated by a multiplicity of factors in which not only the nature of the training or course is important, but also considerations of cost and time play a part. If cost is a burden and time limited, less labour-intensive methods are chosen more often, and an analysis of existing information, for instance based on alumni surveys supplemented by desk-top research, will be chosen. The scope of the problem also plays a major role. If a specific part of a course is concerned, it may be possible to make do with a job analysis. If there are questions about the future development of a profession and its effect on a curriculum, an investigation into the development of key qualifications is more likely.

In contrast to curricula designed in business and in primary and secondary vocational education, curricula in higher education are often designed without any systematic investigation beforehand into the job profile on which the training is focused and information is used that is obtained from surveys of the opinions of alumni on the match between training and job requirements. On the other hand, particularly in higher education, ideas from the target profession on the relationship between the curriculum and job requirements are becoming more and more important, including as part of accreditation procedures.

3.3 The design of competence-based curricula

Characteristics of competence-based curricula

This paragraph refers to the fourth variant of competence-based education (see para. 2). A competence-based curriculum gives consideration both to the optimisation of the relationship with the labour market and to pedagogic innovation. A competence-based curriculum is not only geared to the competences of the job and training profile, but generally shows a number of the following pedagogic characteristics (Schlusmans et al 1999, Keun, 2002, Mulder, 2004):

- focus on problems from professional practice;
- integration of the acquisition and application of knowledge and skills;
- the student's self-responsibility;
- co-operative learning;
- new forms of testing;
- use of ICT.

These characteristics are explained briefly below.

Throughout the entire curriculum attention is focused on problems from professional practice. This may take various forms, ranging from cases and descriptions of problem situations introduced into the school environment to virtual businesses (Bitter-Rijpkema et al, 2003) and to genuine professional situations in practice (job placements, graduate assignments). Here,

the creation of the most authentic possible contexts is considered extremely important (Gulikers et al, 2002).

The acquisition of knowledge, skills and attitudes and their application is integrated. So students do not first learn a miscellany of knowledge and skills separately and then apply them to a practical situation but the acquisition of knowledge and skills is stimulated by applying them. Students are constantly being made more responsible for their own learning and competence development. A competence-based curriculum teaches the student to control his own development, with instruments such as portfolios, personal development plans and study contracts being of crucial importance (Elshout-Mohr et al, 2003). Syllabuses are increasingly personalised and geared to the students' initial situation and learning needs.

Co-operative learning also plays an important role in competence-based curricula. For instance learning in groups via project or problem-guided forms of education is often an essential part of the curriculum (Baert, Beunens en Dekeyser, 2001, Kreijns, Kirschnner and Jochems, 2002).

Lastly, testing is integrated into the learning process and, in a competence-based curriculum, not only the acquired knowledge and skills but also competence is tested. Here, an important factor is the introduction of new forms of testing such as performance assessment, authentic testing and peer assessment (Tillema et al, 2000). Competence-based testing appears to be the Achilles heel of competence-based education. If students are only judged on the knowledge they have acquired while skills and attitudes are ignored in the assessment, students will only bother to acquire the knowledge needed for the test. Competence-based testing presupposes the integrated testing of knowledge, skills and attitudes, not only by a recapitulative test at the end of the learning process but also by a formative test to give students interim information on their progress and encourage reflection on their own performance. Traditional forms of testing, such as multiple-choice questions, open questions or essays are regarded as inadequate to say anything about competences because the focus is only too often on knowledge. New forms, such as simulations, skills labs, or appraisals in the work situation, will have to be added to the test repertoire to be able to assess adequately whether students have acquired the entire competence.

A major issue in competence-based education is the validation of non-formal and informal learning (Colardyn and Bjørnåvold, 2004). In competence-based curricula the recognition of previously acquired competences is becoming ever more widespread for the purpose of granting exemptions. An inventory of the procedures already adopted in practice in higher vocational education for the accreditation of prior learning (APL) shows that countries such as Finland and the UK have developed national systems for this purpose equipped with the necessary statutory frameworks (van Rens, 2004). In contrast, higher education in the Netherlands is still at the experimental stage; local initiatives are being developed but they are

particularly focused on determining the candidate's knowledge, in particular the knowledge expressed in formal certificates and diplomas.

A separate issue in drafting competence-based curricula is the use of ICT. ICT is often seen as a major precondition for the creation of a competence-based curriculum. This means in particular the automation of the learning process in an electronic learning environment, in which the supply of a large quantity of supporting information, the creation of virtual contexts, the offer of communication options and the flexibilisation of syllabuses is central (Klarus and Kral, 2004)

3.3.1 Design methods

The design of cogent, competence-based curricula demands precise gearing of learning activities, instruction and testing (Biggs, 1996), in which first the tests of skills are determined before learning activities and instruction are designed. This is at odds with the usual approach in education, where the tests are only designed as the last component of instruction.

In the design of competence-based curricula, traditional instruction-design models, based on learning simple knowledge or skills, are no use. However, there are few reliable guidelines or approaches available to design or redesign a competence-based curriculum (Petegem and Valcke, 2002). Nor do descriptions or presentations of good practice offer satisfactory methods because they often relate to things such as job placements or practical training or the use of portfolios and do not extend to the level of the overall design of the training.

There are two methods of design that appear to offer a satisfactory basis for designing competence-based curricula: the cognitive apprenticeship model and the 4C/ID-model.

The Cognitive Apprenticeship Model (Collins, Brown and Newman, 1989) is based on cognitive ideas about learning. The instruction model is modelled on the earlier master-journeyman relationship, in which newcomers learn as much as possible on the job from the master himself. Three characteristics are central to this model: modelling, coaching and fading. In constructing a curriculum, this model gives a number of instructions:

- make authentic tasks the focus;
- introduce increasing complexity into tasks so that they always contain; more skills and concepts that reflect expert behaviour;
- provide sufficient variation in the execution of tasks;
- first present tasks as a whole before concentrating on the separate parts;
- ensure close monitoring of the student so that the degree of support can be adjusted to the student's specific needs.

Although the Cognitive Apprenticeship Model clearly shows the effective methods of acquiring competences, it gives designers virtually no clue as to how they should design competence-based teaching practices.

This contrasts with the 4C/ID-Model, which shows in great detail how designers should go about their task (Van Merriënboer, 1997).

The 4C/ID-model is based on the modern principles of Instructional Design (ID) (see also Merill, 2002). One feature of this model is that it starts with an extensive analysis of the way in which experts carry out professional tasks in practice. Complex skills or competences are analysed down to their constituent skills. Specific to the 4C/ID approach is the principle that constituent skills and accompanying knowledge must be coordinated and integrated. The model gives some clues for the design of a learning environment that focuses on the stimulation of complex learning, the integration of learning and working and the offer of built-in support. The model distinguishes between four components (4C) that together form the instructional blueprint: learning tasks, supporting information, just-in-time information and task segmentation. An integrated learning environment can be created with these four components. The most important component is authentic learning tasks based on situations from professional practice. Each learning task contains the entire professional task and is conducted in a realistic professional situation. Learning tasks form the 'backbone' of education. The other components are developed in relation to the learning tasks. Learning tasks are divided into classes arranged in order from simple to complex, depending on the degree of support. There must be enough variation between the learning tasks in one task class. A learning task from the highest task class, in which the task is carried out independently, can be used as a test (Hoogveld et al, 2002; van Merriënboer et al, 2002; van Merriënboer, 1997).

4. An agenda for educational practice

This article explains the background of the concept of competence in higher vocational education and then discusses questions arising in the development of competence-based education. In brief, it can be stated that competence-based education is in fact a catch-all term concealing many different forms of education. The competence-based concept is also discussed at various levels, ranging from a single course to total training. Looked at relatively, a number of interesting examples can be found at course level. Otherwise it is found at the level of 'inter-course' training aspects and at the level of total training design, which is probably where there is the greatest need from the point of view of educational practice.

In conclusion we can say that the concept of competence has found acceptance but that a number of subjects are still neglected. To conclude this paper we would like to touch on a number of issues that in our opinion are essential to the further development of competence-based education.

1) Because competence-based education is a catch-all word, it is important to clarify what options are available to create competence-based education. Does 'competence-based' mean that all parts of education

are competence-based? Or must integration classes be added to the curriculum? Does 'competence-based' education mean the end of formal lectures and theory lessons? It is important clearly to identify the various options, including their consequences.

2) The development of competence-based job and training profiles is a matter of concern. Competence-based profiles differ from conventional profiles by having more stress laid on the integration of knowledge, skills and attitudes into meaningful wholes. There are no approaches or procedures for this. There is also a lack of knowledge on how the profile can fulfil a guiding role in the continuation of the process of educational development. In competence-based education it is important that the cohesion between knowledge, skills and attitude is retained. That is often still the case in the training profile, but there is a real risk that the connection is being moved to the background in the further development of education. There are still no integrated design methods suitable for competence-based education.
3) Besides the above points that focus on the design and execution of competence-based education, it is important that the implicit claims of competence-based training be investigated further. 'Competence-centeredness' is associated with broad usability, with a greater accent on 'being able' instead of mere knowledge acquisition. Research into the position of graduates on the labour market and changes in their position over a lengthy period (longitudinal career research) should indicate whether these claims are actually being realised.
4) Competence-based education demands a huge amount of investment both in monitoring and in testing, and the question is whether this is economically feasible. Researchers will have to seek out smart, economically sound educational solutions, probably with the help of ICT, to make the offer of competence-based education affordable on a large scale.

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