

A Critical Review of Vocational Education and Training Research and Suggestions for the Research Agenda

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Abstract

This paper gives a description of research in the field of Vocational Education and Training (VET). The field of VET research is quite scattered, so giving a full overview is hardly possible. Nevertheless, the VET research presented at the European Conference of Educational Research 2011 (Berlin) is reviewed, as well as the content of a number of VET research journals of publication year 2011. Research themes and topics are defined, and according to the categories the research is reviewed. The conclusions of the review are: 1. there is a large amount of research on VET which is quite diverse and fragmented; 2. much VET research lacks theoretical and empirical foundation; the dominant research methods are case and desk studies and explorative and analytical studies. There are hardly any experiments and intervention and design-based research studies; 3. there are various urgent topics for further research, which are elaborated in the paper.

Introduction

The purpose of this contribution is to give an overview and analysis of the current research in the field of VET. The reason behind that is that we think this field of research has developed well during the last two decades, but that further development is needed since the problems around and within VET are pressing whilst this sector of education plays an essential role in socio-economic development (Mulder, 2012). It is not by coincidence that the European Union has agreed upon the Copenhagen declaration on enhanced cooperation in vocational education and that EU member states with strong VET systems are doing relatively well in the current economic recession.

To be able to make this overview it would have been helpful if a classification scheme of vocational education and training research existed. However, since VET research is a relatively young field, there is no standard classification of its research domain. There are a number of key publications on VET research, such as the latest research report of Cedefop (Descy, Tchibozo and Tessaring, 2008; 2009a; 2009b), and the Handbook of TVET Research of Rauner and Maclean (2008). The Vocational Education and Training Research Network of the European Educational Research Association also employs a VET research categorisation scheme, and well as certain journal do in promoting the submission of manuscript for reviews. The categorization schemes included in these sources however are diverse and not compatible and thus not suitable for generating a total overview of research themes. In an earlier paper (Mulder & Roelofs, 2012) which served as the basis of this contribution the categorization of the research themes are elaborated, but the word limitation of this contribution makes it impossible to include that here.

So we observe that *different sources* of vocational education and training research use *different classifications* of the research, although these sources vary in the extent to which they aimed at arriving at a classification. Therefore it is difficult to take one of these as starting point for making an inventory of the current vocational education and training research. As a consequence of that we established an inventory based on the research that has recently been presented.

Research question and methods

The research question of this contribution follows from the purpose of the study, which is to give an overview of VET research and to formulate suggestions for further research. More technically speaking, the research question is: *what research is reported at the latest VETNET conference (Berlin 2011) and in the 2011 volumes of the following journals: Journal of Vocational Education and Training, Vocations and Learning, and Empirical Research in Vocational Education and Training*. Based on a critical analysis of the various studies which are included in the review, suggestions for further research are given.

This review study is based on a qualitative analysis of the research reported at the conference and in the journals mentioned. The VETNET conference was selected as source of information because it is regarded as the only annual European conference on VET research. Other conferences (e.g. of the Journal of Vocational Education and Training in the UK and the German Hochschulstage berufliche Bildung) could also be included.

The selection of journals was based on the following inclusions criteria. The journal had to be published in the English language, it should be published within the European Union, have an international scope (based on the editors and editorial boards), be research-based or -oriented, and have vocation(al) education or learning in the title, listed in the SSCI or be fully peer reviewed. This resulted in the journals mentioned.

Of the VETNET programme 46 papers were included which were published on the website of the programme; 13 papers were sent in upon a special request, as they were not included in the website. Books that were sent in as the basis of presentations were not included in the analysis. That resulted in 59 VETNET papers. Of Vocations and Learning 13 of the 16 were included (the 3 others were book reviews). Of JVET 39 papers were included (there were 40 but 1 was already included as VETNET paper). From Empirical Research in Vocational Education and Training the 8 papers that were available (not the guest editorial) were included. This resulted in a total of 119 papers which were reviewed.

For the current review it was impossible to include other conferences and journals. Reviewing the selected papers already took a great effort (1/4th fulltime working year).

The papers were summarized, compared and research themes were identified. Via inductive labelling topics were defined by which the larger research themes were operationalized. This resulted in an analysis scheme by which papers could be categorized (see Box 1).

The papers were then categorized qualitatively, via an inductive interpretative analysis of the problem statements, research questions, results and conclusions. When papers could be allocated to different categories, the dominant research theme or the most important conclusion(s) were leading the final classification.

The themes and related topics served as headings for the presentation of the research results. Conclusions and suggestions for further research were derived via further interpretative reasoning.

As a disclaimer we would like to mention that we are not ignorant of the fact that the selection of work we analysed is but a part of all research that has been done in the field of vocational education and training. Also in other fields research is being done which is relevant for vocational education and training, such as in youth studies, cultural studies and brain research. Much of this research is not presented at VETNET programmes of ECER conferences not in VET research journals. Apart from that influential research is published before 2011. Nevertheless, we believe that the selection we made is large enough to say at least something about the current state of play regarding VET research.

Finally we would like to note that given the large volume of the work we studied, the descriptions of the studies we reviewed are necessarily extremely short so that we cannot really do full justice to the research that has been presented and published. Longer summaries – which we created – would be preferable, but there is no room for this in this contribution. Interested readers may however request (unedited) copies of our summaries.

Results

Based on the bottom-up procedure of clustering papers described above, the research classifications included in the publications mentioned, and multi-decade experience with other classification systems in educational research (as used by the AERA and EARLI, etc.), we arrived at the following categorization of research themes (see Box 1). Research topics are also based on the comparisons of the research papers included in our analysis and serve as operationalization and demarcation of the themes.

Box 1. Classification scheme of VET research themes and topics

<i>Themes</i>	<i>Topics</i>
VET and society	<ul style="list-style-type: none"> • Cultural aspects • Career perspectives and personal development • Partnership and cooperation • Dropouts
VET policy, organization and management	<ul style="list-style-type: none"> • VET policy • VET organization and management
VET teacher education and teacher behaviour	<ul style="list-style-type: none"> • Roles and tasks of teachers in VET • Teacher education and the teaching profession
VET Curriculum	<ul style="list-style-type: none"> • National level • Institutional level • Classroom level • Student level
Learning and instruction in VET	<ul style="list-style-type: none"> • Informal learning • Collaborative learning • Practical simulations • Learning in universities • Transferability of

knowledge

Assessment and testing of educational achievement in VET

Apprenticeships/internships/workplace learning

- The apprenticeship system
- Duality and apprenticeships
- Preparations and support
- Experiences with apprenticeships
- Perceptions of teachers
- Views of employers

We will present the results of the review according to this categorization. An overview was made of all papers by author, research focus, educational level, theoretical framework and research strategy. This overview is added as Appendix.

VET and society

Vocational education and training and society is a very broad theme. The papers that fall in this category are quite diverse and are about cultural differences, career development, labour mobility, partnerships and drop outs. For society it is important that the quality of education is high, that there is good cooperation between the different educational institutes, and that schools have constructive partnerships with companies and other schools. They should aim on social capital building and not only on human capital. Related to this, an important role for education is the promotion of sustainability (Margeviča & Grinsbergs, 2011). Schools can contribute to this in various way, if it is only to let students come to school by bike and the separation of waste. School management has an exemplary role in this. Dietzen and Wünsche (2011) examined perceptions of employers on graduates from VET and universities. They worried that employers would rather choose for university graduates because their way of thinking makes them more flexible than VET students who however have many practical skills. But it seems there is no major shift in the recruitment policy. Regarding special target groups, Hughes and Hughes (2011) studied the relation between VET education and the deaf community. This community already focuses on social capital development and the VET system can learn from this.

Cultural aspects

School systems vary across countries and reflect the concerning national or regional cultural beliefs. In China for example it is common practice that teachers speak and students listen. Hua, Harris and Ollin (2011) studied a communication lesson which was student-centred. Most students appreciated the interaction and role playing and they thought it was good for the development of their self-confidence. Not all students experienced it as a learning opportunity however; they perceived the activity more as entertainment and therefore did not see much added value of it.

The new educational approach of the study implies a big cultural change, but eventually it may help to cultivate a new generation with the autonomy and awareness to be able to handle challenges of the global community. Another issue in education in China relates to the enormous differences between regions and especially between rural and urban regions, which is studied by Xiang (2011). Big investments are made in human capital development for people in urban areas, but educational investment in rural areas lays far behind. However, education for rural people is also very important for the economic development of China. The author is saying that not all educational resources should be invested in urban; rural development also requires the provision of educational facilities to give the rural population a better future perspective. Baqadir, Patrick and Burns, (2011) reported that in Saudi Arabia there is a gap between knowledge and skills of graduates on the one hand and qualification needs of employers on the other hand. Status is of great importance in this culture, novices are ambitious of getting good jobs with high remuneration. The authors state that it is necessary to change the educational system to establish higher quality, but that the attitude of students also needs to change.

Career perspectives and personal development

After graduation a logical option for the graduates is to find a job in their field. But whether they indeed choose to do so depends on various factors. The article of Clark, Zukas and Lent (2011) is discussing the transition from education to the field of information technology (IT). Education for this field is very broad as the range of occupations in IT is very wide. The authors conclude that companies mostly look at qualities of graduates but the organizational context, the habitus and the resources are also important. Spierings and Meerman (2011) did research on human resources graduates and how they find their first job. They found that a student can sometimes stay with the company at which they did their apprenticeship, but most of the time they have to seek for a job. The first job acts as a stepping stone for the rest of the career, especially in times of crisis. Graduates are adjusting their expectations; at the beginning they want everything, but after a while they become more realistic. Travel time and salary get less important; they search for an interesting job in which they can develop themselves. Schweri and Trede (2011) looked at the career intentions of Swiss healthcare assistants. Graduates who think about the future mostly choose to continue their education. Other graduates choose for direct money and start working. Intrinsic and extrinsic motivation play a role in this choice but also economic factors and experience. Continuing studying leads to more salary afterward. Cattaneo (2011) did research about getting a degree of Professional Education and Training (PET) on the job. He looked at direct and indirect costs and benefits. It seems that only in exceptional cases benefits do not compensate costs. Almost every candidate gets more salary after getting the PET-degree.

Personal development is important in almost every occupation. Lifelong learning is needed to cope with the constantly changing knowledge economy. Not every employee believes this to be a good a desirable development. It seems that lower qualified workers have a lower learning intention and ambition as well. They tend to have a more negative view on learning and do not see the chances for development on the labour market. Possibilities employers offers do not fully reach lower qualified employees. Job autonomy or financial benefits however can stimulate the willingness to engage in training. People with a high degree of self-efficacy tend to have a stronger learning intention (Kyndt, Govaerts, Dochy & Beart, 2011). A personal development plan (PDP) can also have a positive influence on the motivation to participate in training activities and on the overall job performance. The PDP is a development tool but can also be used as a promotion tool or salary or selection tool (Beaussaert, Segers & Gijselaers, 2011).

For new employees, induction takes time, but the duration of that depends on the quality of education. If a graduate has acquired many practical skills the induction time is shorter. Short induction periods give employers a positive opinion on the new employees, their attitudes and dedication to the job (Geiben & Grollmann, 2011). There is also a relationship between education, gained skills and knowledge, jobs, tasks and wage levels of graduates. Graduates with the same

educational background often work on the same task content. Students gain task specific skills that influence their occupational choice (Rocher, 2011). Diverse skill combinations gave a good indication of job mobility. If the skill combination is very specific the chance that employees switch jobs is small. If competencies are similar than job mobility can occur, knowledge will not get lost and the salary will increase (Geel & Backes-Gellner, 2011). If employees have a higher education level than the job asks for, they receive a higher salary than others in the same job, but less than if they would have a job at the level of their education. Productivity is the driving mechanism behind the relationship between job complexity and salary (Tahlin, 2011). There are many employees who think that their job can also be done by someone with a lower qualification; 12% of the employees in Germany have the feeling that they are not enough challenged by their job. Because of polarisation in the work field the percentage of over-qualification has grown (Rorhbach-Schmidt & Tiemann, 2011).

Partnerships and cooperation

There is not always good cooperation between VET education and universities. Sometimes there is competition between VET and the universities. Partnerships and good cooperation within a country are better if the region is not too big. It takes time to build good networks, it takes about two years before two partners speak the same language, know and trust each other and have real expectations. If the networks flourish than things can be outsourced, both parties stay informed on technological developments and students can get opportunities to meet companies (Stenström, Nikkanen and Itkonen, 2011). If there is good cooperation between schools and companies there are more apprenticeship places and other facilities for the students. But good cooperation costs time, money and effort (Rose, 2011).

Dropouts

An important topic in many countries is the dropout rate. Not all students finish their education and get a diploma. It is important to know what factors influence this decision and to find a solution to lower dropout rate. It is a very complex problem and if the problem is solved for one student it can be a disadvantage for another one (Jørgensen, 2011). The background and network of students play an important role (Jørgensen, 2011; Van Esch & Petit, 2011). Van Esch and Petit state that dropouts have less abilities to seek for help with their homework or to use their network to find an apprenticeship. Social background determines to which kind of school a student goes, and is related to the chance on dropping out, even as the social group to which a student belongs and the extent to which a student can handle freedom and responsibility (Jørgensen, 2011). Important factors that Bragt, Bakx, Teune, Bergen and Croon (2011) determine are the quality of the learning environment, the students pragmatic and personal orientation, and the interest in their future occupation. They think the risk on dropouts can be diminished by better information on the study/job, an intake interview and more coaching, also from older students. Students tend to think that if they succeed it is because of their skills and knowledge and if they fail it is the fault of the environment, and if others fail, that they have to blame themselves (Bragt, Bakx, Teune, Bergen & Croon, 2011). Percentage of dropouts is highest with immigrant students, but of course there are always some exceptions. The research of Stamm, Niederhauser, Leuman Sow, Kost and Williner (2011) states that there are also excellent students among the immigrants, but in motivation, attitude and enthusiasm they do not differ from the autochthonous students who excel.

It seems that the curriculum needs changes to better fit the needs of migrants and to give them a bigger chance to successfully complete their study and to find employment. Problems occur because of languages delays (Lasonen, Cools & Teräs, 2011). Female immigrants have it even more difficult because they are still a bit disadvantaged in comparison to male. Immigrants are still more affected by unemployment than the native population (Lasonen, Cools & Teräs, 2011). Not

only differences in background influence the study and career paths. Also gender and cultural differences play an important role, female students still tend to choose for caring jobs and male for more technical occupations (Monton, Collins & Eaton, 2011). This problem also needs attention.

VET policy, organization and management

Governments, inspectorates and other institutes play an important role in educational policy making, enacting regulations and defining frameworks for VET. But at the level of the educational institution, such as schools, training centres colleges and universities, educational philosophy, mission and vision, educational policy and strategy also play a crucial in establishing quality education. There are many differences in educational policy, organization and management between countries, and many international comparisons have already been made. Nikolai and Ebner (2011) added to this field of research by making a comparison between vocational training and higher education in Switzerland, Austria and Germany. They studied the possibilities for students to follow a specific education program, to move to a different program, and to the entry requirements. They also checked the influence and vision of companies/employers on the school system. This seems to depend on how the dual system is embedded in the whole education system.

VET policy

Avis, Canning, Fisher, Klein and Simmons (2011) made a comparison between the policy of the English and Scottish education system. In England there are standards and a regulated framework for VET. VET in Scotland has less regulation and much more autonomy for educators to develop a meaningful program. Both systems have their advantages and disadvantages and teachers try to work as good as they can between the boundaries of the system. Both countries are interested in the development of their students and want space for autonomy. What is still needed is a deeper understanding of VET that goes further than pedagogical skills but also focuses on societal and education relations. Normand (2011) goes more into detail in the Scottish college system, namely on how they responded to the EU and national policy on lifelong learning. The Ministry of Education in Scotland has a 'Skills for life' strategy that focuses on the development of skills and employability. Lifelong learning needs a cultural shift regarding the esteem of competencies, knowledge and skills, but it seems that Scotland holds on to its traditions, values and principles and that these are consonant with the purpose of lifelong learning.

But also in many other countries research is done about the school system. Lau and Kan (2011) focus on the school system in Hong Kong. The school system was a colonial model based on the British tripartite education system but that has developed into a comprehensive education system. Bicer (2011) did a study in Turkey, where the school system is recently restructured. The new program is student-centred, should have a better link with the labour market and focus more on generic rather than on specific competencies only. The new system is more decentralised, but this means that schools need to build a strong relation with the labour market. The changes are perceived as being positive, but there is still a gap between the intended and implemented framework. Students for example, do not know how to deal with their new independency. Kupper and Kleijn (2011) studied innovation in vocational and professional education in green education in the Netherlands. Vision, goals and strategy of the innovation policy is defined in a five years policy plan. Two main points in this plan are the quality of education and knowledge transfer. The study was about the development of a methodology for monitoring innovation achievement on the basis of identified critical success factors. Monitoring is used to stimulate learning and knowledge sharing on the one hand, and for progress reporting to the Ministry of Economic Affairs, Agriculture and Innovation.

VET organization and management

Educational policy development in countries is the result of decision making by the government and the stakeholders around that, such as political parties, advisory councils, boards, committees, professional associations and pressure groups. Regulations have a multi-level character. There is the *acquis communautaire*, national legislation and institutional regulation. How schools deal with these depends on various factors, including the perspective of the organization and management. Warmington (2011) studied the challenges and relations between organizations, diverse governments and employees. Often there is a lack of communication and there are tensions between them and the local authorities. A clear common vision on professionalism and cooperation can improve this. Not everything that is imposed from above also happens in reality. First tier management in further education have to measure up to the demands of the students, their team and the organization. But they have a limited time available so they have to make choices. This struggle causes managerial resistance. They sometimes openly resist to do something, but it also occurs that they promise they will do things that are agreed, but that they actually refuse to do it. Resistance occurs because of a lack of time but also on fundamental objections. But resistance does not always have to be seen as something bad, it can also be regarded as act of participation instead of separation (Page, 2011).

In companies, managers also need to recognize larger and smaller gaps of skills and knowledge. If not, this results in a lack of motivation of employees, poor customer service and the leave of employees who perform well. Skills gaps also influence the goals/planning and market position. Most managers report that skills shortages occur because of changes in the market or organization, a lack of qualified candidates and insufficient time and money for professional development. The gaps are biggest in smaller companies because of poor recruitment systems, though in most cases motivation in these companies is higher (Lindorff, 2011). Lifelong learning is important for everyone, and small companies should not be excluded from that. Franz (2011) writes about the perspectives on teaching in a knowledge society. It seems that every group of people, teachers, managers and the administrative staff, look at new learning in a way it does not force them to take action. They see it for example as a matter of re-badging, or as a way to exchange learning methods, but not as something that really needs change and implementation.

VET teacher education and teacher behaviour

Teachers play a very important role in education in general, and in VET as well. Most researchers who write about this theme state that there is not enough attention for the personal beliefs and professional development of teachers. Teachers are responsible for facilitating learning of students, but this is an extremely complex challenge. Avis, Wright, Fisher, Swindell & Locke (2011) in their study found that in general teachers are very committed to their job. They care about the wellbeing of their students and want to prepare them for their future lives and careers (Kemmis & Engström, 2011). Teachers feel a great responsibility for their students. They want to give every student the right amount of care and want to challenge them at their own level. Teachers often feel that it is their fault if a student fails. Teaching is an emotionally draining job and teachers need much more than only their professional knowledge. Recognition of this complexity may cause a relieve in their emotional costs (Avis et al, 2011). Next to this the teaching profession is also very complex because teachers have to meet the requirements and wishes of politics, companies and the students (Kemmis & Engström, 2011). Furthermore, they need to make sure there is a good balance between theory and practice and that students gain the right skills and knowledge.

Roles and tasks of teachers in VET

Almost every article on teacher education, teacher professional development and the role and tasks of teachers address the complexity of this profession. What is expected from a teacher is very context-dependent as well, just like the roles that can be distinguished. Teachers have to

continuously switch roles. According to the article of Schaap, Van der Schaaf and De Bruijn (2011) it is sometimes hard for teachers to switch between roles. Teachers are still focussed on knowledge transfer and it is difficult for them to step back and let go of their steering role. There needs to be a good balance between knowledge transfer from the teachers, complexity of the core problem and the students thinking level. Also prior knowledge must be taken in to account. The article of Oonk, Beers, Wesselink and Mulder (2011) gives insight in the diverse roles and tasks of teachers in a regional atelier, an authentic learning environment. Eight roles appeared of which three roles were specific for this context. Three other roles appear in more learning environments but imply some specific tasks in the regional atelier; the last two roles appear in the same way as they do in other learning environments.

In the study of Gale (2011) totally different teacher roles are discussed. This article is about vocationalism and academia. The lecturer can be a teacher, a researcher and a scholar, there needs to be a good balance between these roles. In vocational/higher education teachers will be judged on the results of the students, in universities they will be judged on their research results. The study of Ingleby (2011) is about yet another role, namely the role of mentoring in education. The participants of his study do not think mentoring is a clear educational initiative. It needs to be set up as a professional role and mentors and mentees need to develop a shared understanding of the objectives of the mentoring program. McGinley and Grieve (2011) discussed differences between the role of teachers and that of youth workers. The role teachers have in schools is based on power and authority. This influences the relationship between teachers and students. The relation between youth workers and young people is more flexible, and youth workers can be more responsive to the needs of the young people. Between the youth worker and youth there is more space for democracy; at schools rules and regulations are more tight.

Teacher education and the teaching profession

Not all teachers have the same expectations of the job and also the system of teacher training can be very different. In Europe there are many different training systems, teacher training in for example the Ukraine, is not as elaborate as in most European countries. Folvarochnyi (2011) states that Ukraine wants to comply more completely with the European guidelines. It is important that they adapt to professional standards and get a qualification system. Education needs to be more practice-oriented and final examinations are needed. Another difference is about the way in which students can become a teacher; in some cases teachers need an academic degree to teach in VET education, and in other cases they need a number of years working experience before they can go to teacher training. Also the reasons to become a teacher (Hof, Strupler & Wolter, 2011) or to stay in the profession (Fox, Wilson & Deaney, 2011) can be different. For instance, teachers in Switzerland need to have a couple of years of work experience before they can become a teacher. Most of the time they get paid well, sometimes even better than as a teacher. The reason to become a teacher however is more about commitment and the wish for more flexibility (Hof, Strupler & Wolter).

After teacher education the real teaching begins. To feel comfortable in the teaching profession it is important that starting teachers feel welcome at school. Contact with tutors and other teachers is very important and they need to be stimulated to network. It is also important that they make their expectations clear and that they feel supported in the school but also by family and friends (Fox, Wilson and Deaney, 2011). Reflection is also very important for novice teachers (Canning, 2011). There are many forms of reflection that give support to novice teachers, the theory of the reflective practitioner is well-known but also other forms could be useful. Not everything teachers have learned will be needed in practice. Smith and Swift (2011) discuss the language of learning in further education. It seems that the complex concepts and theories from teacher training do not apply to real life and is quickly forgotten. In schools there are two different basic languages: one related to the therapeutic ethos and one that relates to the economic market. Practice is defined by these two languages, and discussions will not be at the level that teacher education expects.

Life-long learning is needed in every country because of the ever-changing society (Misra, 2011). Teachers are critical towards innovations but if they match the themes they find important they will be more willing to continue teaching and to develop themselves professionally. The relation with their students is an important topic for teachers as well as teaching, learning and their subject specialisation (Bathmaker & Avis, 2011). Innovations can also be designed by teachers themselves (Messmann and Mulder, 2011). It can lead to job satisfaction, self-actualisation, motivation and openness. Innovation is a strongly social process: teachers, school leaders, students and companies have to interact.

VET Curriculum

One important theme in VET research is curriculum. Curriculum is generally understood as the “what” to learn. Curriculum research occurs on different levels. The levels are related and have impact on each other. This influence is mostly noticeable from the higher levels on to the lower levels. There is also a link between curriculum and the other themes. It is not possible to make a categorisation without any overlap.

National level

Research at this level is about the national system and the core objectives. In this review the distinction was made between an article about a Qualification and Credit Framework and articles about Competence-Based Education. These studies included here are all conducted at national level and explore the specific consequences of more general policy decisions.

Qualification and credit framework

One study was conducted at this level. This study, carried out by Lester (2011), gives a critical analysis of the Qualification and Credit Framework (QCF) of the United Kingdom. He states that the UK was a pioneer regarding qualification frameworks, but that it cannot compete with other countries anymore. The QCF focuses only on vocational education and has no link with higher education or other educational systems, it lacks capacity to recognise learning that is not present in the framework and has a very limited capacity to adapt to change. On the positive side it was noticed that the introduction of the framework went pretty smooth and that there is a good focus on outcomes rather than on learning only. Also, it has a good focus on the match between learning and an output-based unit specification. QCF is a framework that can help to reform the qualification system.

Competence-based education

There are three studies about competence-based education. The overarching theme of these studies is implementation of competence-based education. In the research of Sturing, Biemans, Mulder & de Bruijn, (2011) the emphasis is on the evaluation of the model for comprehensive competence-based vocational education in the Netherlands. It seems to be a proper tool, that is used by teachers in the way it is intended, which is to evaluate the ‘competentiveness’ (the degree to which the education program reflects the implementation of principles of competence-based education) of their study programmes. Nederstigt and Mulder (2011) showed that a the introduction of competence-based education in Indonesia can cause a lot of resistance because the society is not ready for this educational innovation. The principles of competence-based education were evaluated and adapted to the context of use. Mulder, Eppink and Akkermans (2011) studied the introduction of competence-based education in East Africa, and conducted an impact assessment. The stakeholders were positive, but the study also yielded important information

about preconditions of the implementation of competence-based education. The conclusion of the studies is that competence-based education is a product of the western world and cannot be implemented in developing societies without taking the context in to account.

Institutional level

First, the educational programs of some schools will be discussed. Next, some attention will be given to learning fields. Learning fields are developed and agreed at national level, but in this case the focus is more on the practical implementation at school level.

Educational programs

At the institutional level the research focuses on how the curriculum for a specific course or occupation can be shaped. It is about important competencies for those occupations and evaluating the curriculum. It is important that students have a good understanding of the identity of a professional in the field and there should be a good balance between theory and knowledge. Students should be able to see the link between what they learn and what they will do in their profession and they should gain the right know-how. There is a wide range of subjects that can be studied in this field. In this review there are four articles at institutional level that focus on school programs. Jeffrey and Brunton (2011) wrote about the development of a framework for communication management competencies. Practitioners and academics needed to come up with one common framework. The article of Lindberg (2011) is about students missing the link of mathematics in their future profession. The relevance of mathematics was incorporated in the curriculum and will be implemented. The research of Waterfield (2011) focuses on the knowledge and professionalism of the future pharmacist and the aspects that contribute to the design of their curriculum. The last article, the one from McLaughlin and Mills (2011) is special, because it is not only about a good balance of theory and practice, it is even so that students in construction management education can get a dual parallel qualification in the same time. The research of curriculum on the institutional level appears to be showing best practices and important themes for curriculum development.

Learning fields

Two articles are about learning fields. The reason for the introduction of learning fields is that it is expected that they will increase the quality of vocational education. Every discipline has its own set of learning fields which are competence-based, and schools have to choose their own learning situations for the learning fields. This freedom can cause big differences between schools, classrooms and teachers. Only the concept of learning fields is worked out well, but schools/teachers are left with lots of questions on the content, organization and teaching methods. Burchert (2011) and Marks-Maran (2011) both conducted a study about the influence of learning fields on the transfer of learning. Burchert did a theoretical review while Marks-Maran focused on a case study. Both state that learning fields can promote transfer of learning but it must be shaped properly and have a tight link to the rest of the curriculum. An important conclusion Burchert draws is that there is a need for an analysis of concrete implementations. We will come back to the study of Marks-Maran when we discuss practical simulations under the heading of learning and instruction.

Classroom level

At the classroom level one study is presented, which is on entrepreneurship. The study of Do Paço and Palinhas (2011) is based on a case study about teaching entrepreneurship to children. A study program was developed to teach very young children about entrepreneurship, something that is

not common in the curriculum. The program seemed to help the children to understand the world around them a bit better to stimulate their creativity, curiosity and responsibility. Their knowledge level increased although this was hard to test because the assessment probably was not on the right cognitive level for the age of the children.

Student level

At this level the curriculum focuses on the individual students, their needs and expectations. Most research that is presented at this level is about the available support students can get. The focus is on the problems with student literacy.

Student literacy

Three studies are about the literacy of students who have English as a second language. The focus is on what support the students need. Literacy is important because students have to do assignments and tests in English, talk to customers and need to understand theories. The curriculum does not pay enough attention to the literacy needs of the students. It is not only a problem with grammar but cultural differences can also play a role. It is important that teachers know how to support the students. All articles pay attention to the necessary support for the teachers. They feel they do not have enough knowledge/time to support the students properly. Kimmelman (2011) specifies that the literacy of students needs a bigger role in teacher education. Heatley, Allibone, Ooms, Burke and Akroyd (2011) and Strauss and Mooney (2011) elaborate the way in which support can be given to students. Heatley et al. (2011) did their research about one-to-one sessions and workshops on writing skills; the results showed that this can help students to build confidence. Strauss and Mooney (2011) state that it is important that support focuses on the specific discipline. Face-to-face workshops are more appreciated by the students than online support.

Learning and instruction in VET

The theme learning and instruction is generally understood as the 'how' of learning. There are differences between learning in schools, universities and at the workplace (James, Guile & Unwin, 2011). Students use different learning styles in different contexts (Schaap, Baartman & de Bruijn, 2011) and they have personal preferences. Adult learning for example needs attention on its own, as they are very diverse and have their own learning needs. Social motivation appears to be an important role for them. Some prefer individual learning, others like group work, some want practice-oriented education and others like the traditional way of learning (Votava & Husa, 2011). Learning is complex and not only about gaining knowledge and skills. It is not only about the intellectual brain it is also about social and emotional interests (Hyland, 2011). Gibbs and Maguire (2011) even see a relation between learning and therapy. Learning used to be seen as a way to cure a bad intellect or moral habits. Learning and therapy can help with the development of knowledge, skills and experiences. Learning is a treatment for moral of physical non-well-being and be identified with a desire for good. Hyland (2011) states that people have to develop themselves as a whole person and not only intellectually. Students have to learn how to deal with their emotions; this helps them to do their work well. Wandeler, Lopez and Baeriswyl (2011) add the factors hope and health to this. Hope has an effect on competence development even as health. Companies should stimulate hope because just like dealing with emotions, it makes stronger employees. It is also very important that employees feel that they are in a psychologically speaking safe environment with their colleagues and their superior. This allows people to make mistakes, reflect and learn from them. Employees need the feeling they can solve a problem; organizations should stimulate their employees to solve problems and to gain self-confidence. A good superior stimulates problem-solving on the short term but also supports long term

innovations to prevent mistakes. Mistakes should be seen as a learning moment (Hetzner, Gartmeier, Heid & Gruber, 2011).

Informal learning

Learning can occur at schools and companies but also outside in youth work or in free time; this refers to informal learning. Lübcke (2011) studied a video-platform that challenges young students to produce videos about their practical skills. The platform is led by youth workers and gives young people the possibility to upload their videos and to discuss them in a safe environment. The videos can be a good way for small companies to get an opinion about an applicant. Laginder and Stenøien (2011) did research on learning by interest. They studied the commitment people have in dance and crafts. They state that this is a combination of personal interest, group interest and commitment. Learning is informal, self-defined and voluntary. Learning interests emerge by knowledge, skills, meaning and pleasure. By gaining experience the interest can further develop and strengthen the commitment.

Collaborative learning

Learning can occur individually, but also in teams. Team learning is an important feature of the current high-performance workplace and can be seen as the foundation of innovation. James, Guile & Unwin (2011) found that the private sector is the most innovative and for that it needs more support. Also there needs to be attention for the different kinds of innovations. Many innovations are ad-hoc and oriented towards the short term, which is an important reason for the quick disappearance of most innovative ideas. Knowledge is spread over companies, government/schools and institutes, and more collaboration between the stakeholders is needed. Guile (2011) states that working in inter-professional teams is a way to combine all available knowledge, but that this is very complex. Team members have to look beyond their own knowledge domain and be critical and evaluate judgements made by members from other professions, come to a shared perspective and need to agree on how to implement tools to solve problems. There is no good research method to see the real complexity and symbolic of the problem. It is about the space of reasons, thinking, communicating and acting.

Minnaert, Boekaerts, De Brabander & Opendakker (2011) did research on computer-supported collaborative learning (CSCL) and the relation with autonomy, competencies, social relatedness and interest. CSCL is a team learning via online learning platforms which supports interactive knowledge construction. After the first phase of the process students get used to the tool and the autonomy they have, which plays an important role in relation to interest. For competence it is the same, except for the execution stage. Students and teachers agreed that the quality of the learning process was higher if the teachers used CSCL and pointed students at their own learning process and interest development. If the teacher does not give a reaction and/or feedback, the motivation of students to use the tool and reflect on the process drops dramatically.

Practical simulations

There are more ways to tighten the relationship between theory and practice: practical simulations for example. Khaled, Gulikers, Biemans and Mulder, 2011 studied practical simulations in which students were given the opportunity to experiment with and practice their performance. Practical simulations were compared with authentic projects and internships, which seem to focus more on generic skills. What is remarkable is that in all three learning environments knowledge and skills outcomes overshadow competence gain.

The study of Marks-Maran (2011) has already been mentioned in the section on learning fields, but her study is also a well-developed best practice on practical simulation. Her article is about simulations in nursery and she concludes that simulations and the interaction with others,

feedback and reflection, help students with positive transfer from simulation learning to nursing practice.

Learning in universities

The development of knowledge can have a classic scientific basis or a practical base with a big emphasis on communication between stakeholders. Cendon (2011) states that universities can shine a new light on practical problems but they can also generate new knowledge out of practical problems. A university that has a close link with practice has a central role in knowledge production, students must be critical and learn to question the new knowledge. Henriksen (2011) studied the best way to learn in universities. He thinks the combination of practice and scientific knowledge has a large potential. Problem-based learning (PBL) is a good way to teach students knowledge and also how they can use that in practice. It is important that students know how to transfer their knowledge into different situations and how they can further develop that knowledge. This is also beneficial for their employability. Learning has to be student-centred and the student should be actively involved. Kämäräinen (2011) also studied PBL. He gives a very broad overview of PBL in various universities in Europe. He states that there is still an ideal perception on PBL that is hard to implement in practice. In diverse curricula there is space created for PBL, but opportunities for authentic participation in practice and doing projects for companies are less developed. There needs to come a cross-over between academic and vocational learning cultures because now it is not clear how the students' knowledge can contribute to the needs of the participating organizations and their development. Hofmaier (2011) studied an evaluation tool for PBL and concluded that probably not all participants have been able to say everything they wanted because it was based on central characteristics which are weighted. The tool was a self-evaluation tool and how the participants dealt with this was an important part of the research. If students were familiar with self-evaluation the tool was easy to use; if not, students needed more explanations. There were no concrete conclusions on the context of PBL itself.

Transferability of knowledge

Henriksen (2011) mentioned the importance of the ability to transfer knowledge into different situations. Three other articles are also explicitly about transfer-oriented learning. Transfer means that knowledge gained can be used in different contexts. Not only to use the knowledge gained at school at the workplace but also the other way around. Jørgensen (2011) states that knowledge is context and person related. For most students it is difficult to link theory and practice because they use very different learning styles at school than they use in the work context (Schaap, Baartman & De Bruijn, 2011). VET contains cognitive, affective and social learning processes. Students need to reflect actively on their experiences and the processes to become professionals. Students link new knowledge to their prior knowledge but with workplace learning there is so much new information that it can be overwhelming; this can be a reason to prefer learning at schools (Schaap, Baartman & de Bruijn, 2011). Wesselink, De Boer, Oonk and Beers (2011) studied different levels of authentic learning in regional ateliers in the Netherlands and the influence this has on learning goals, roles of students and the role of the teacher. There are four different levels that can be distinguished. At the first two level students work on an authentic task, but it is not necessary that the environment they work in is also authentic. The third level is boundary crossing, students work with stakeholders with different backgrounds and together with colleague-students they have to find a solution. Level four actually leads to regional transition, students participate in a regional learning process and real transformative learning.

Assessment and testing of educational achievement in VET

Assessment/testing is the way to get insight in gained knowledge and skills or competence growth, and to test the quality of education. There are many types of assessment and testing, most of which take place at schools. However, assessments and tests are also being used in companies for the purpose of selection, placement or professional development. This review comprises seven articles that are explicitly about assessment and testing. In other articles that are included in this review the importance of good assessment is sometimes mentioned, but in those cases it is not the focus of study.

As said, there are many different forms of assessment and tests that schools use and it is impossible to assess all learning progress of students in the same way because of the different purposes of assessments and tests and the differences in education context, workplace context and assessors. In their study Willemse & De Ries (2011) state that communication between stakeholders needs to be improved, but that this still does not guarantee quality, because of which assessments will be standardised. Gulikers (2011) found that it is important that assessments have a practical orientation and that assessment are conducted by representatives of practice. Such kind of authentic assessment or the assessment of workplace learning adds value to the quality of education. (Gulikers, 2011; Willemse & De Ries, 2011). For teachers it is important to step back during the assessment and to give students sufficient freedom to perform their tasks (Gulikers, 2011).

Not all forms of assessment should always be used. The assessment form of students in safety sensitive industries for example, should always be considered very carefully. This is stated by Gekara, Bloor and Sampson (2011) who studied computer-based assessment in the shipping sector. They argue that computer-based testing is cheaper, faster and reduces workload of the assessors. But computer-based test still need to be real and valid tests. As known, there is the risk that corruption occurs if testing is commercialised. If the value of a diploma is not guaranteed, shipowners have to invest more on educating employees after graduation. That is why there is a strong interest in guaranteeing the value of the diploma. It appears that even when the diploma quality is right, not all companies think the diploma gives enough information to predict the motivation and performance of a graduate. They use an aptitude test to predict the training success of apprentices, but it seems that this test measures knowledge instead of aptitude (Siegenthaler, 2011). Mueller and Wolter (2011) also state that companies are looking for hard information so they observe abilities and skills. Companies do not treat all students the same, they want to avoid a mismatch.

Next to the form of assessment that is used also the chance to fail or pass an examination is important. In the study of Rottermann (2011) the Swiss federal vocational education and training diploma examination system is evaluated. The study goes into the chance to fail for an examination. It does not only depend on individual criteria but also on the school they choose, their vocation and the company in which they do their internship. The system has a positive impact on the unemployment rate and the motivation of students, but there is still a chance for unequal opportunities; the strength of VET education lies in the decentralised organization but this makes it harder to measure results in an equal way. It needs some effort to counteract distortions due to vocation or company.

The last study in this category is from Bank (2011) and is about assessment of teachers. Bank evaluated the Test of Economic Literacy for teachers. Economic knowledge plays a role in many occupations and teachers in lower secondary education need to know how they can teach economy to their students. The test needs to give insight in the economic expertise and development points for the diverse teachers. However, the test turned out to be too broad to reveal individual strengths/weaknesses. The test needs to be improved and self-assessments need to play a role.

Apprenticeships/internships/workplace learning

Apprenticeships (or internships) and workplace learning are important parts of the VET education in most countries. Various studies are presented on this theme, also in a special issue of one of the journals we included in this review. That is why this theme received quite extensive attention. Filliettaz (2011) states that an apprenticeship place is a rich learning environment where students can gain skills and knowledge. Learning in an apprenticeship is the result of interaction, incentive and content. Poortman, Illeris and Nieuwenhuis (2011) stated that factors like prior knowledge, motivation, guidance by a mentor and social atmosphere influence learning. Deissinger, Heine & Ott (2011) showed that some aspects appear in almost every system but there are also many differences between these systems. VET systems in Europe need to adjust to European rules. Not all apprenticeship systems are flexible enough to deal with this, to connect with other school systems and to give attention to informal learning. Germany, for example, always had a good apprenticeship system but lies behind Austria and France. These countries have more European instruments implemented in their system, and are more flexible. The authors conclude that in comparison to France, Germany has a lack of hybridity and in comparison to Austria a lack of diversity.

Meredith (2011) shows that apprenticeships are not always self-evident. Although they are regarded as being very important for the labour market, they are also very expensive. A reference is made to students in Canada who have many opportunities to get a diploma. In most cases they do not think an apprenticeship is necessary because of the high costs they incur on education. Companies arrange their own education programs if they find this necessary, which is not related to the school system. Another problem is the lack of apprenticeship places. Walden and Troeltsch (2011) state that in Germany there rarely is a balance between supply and demand, schools have to offer alternatives, subsidized by the government. However the problem resolves itself because of demographic changes. Akomaning, Voogt & Pieters (2011) state that in Ghana there are not enough places for apprentices too; 20% of the students studied did not have an apprenticeship at all and only 6% had an apprenticeship place for the whole period of 6 months. The study of Mulder et al (2011) also showed the importance and difficulty to include internships (field attachments) to VET programs in Eastern Africa. Smith, Comyn, Kemmis & Smith (2011) showed that the willingness to make apprenticeships available depends on business decisions. Companies are often quite dynamic regarding the possibility to accept students for internships; they are not always interested in long term outputs of education. However, the authors contend that there needs to be a positive attitude towards apprenticeships.

The apprenticeship system

Kammermann, Stalder and Hättich, (2011) discuss a 2-year apprenticeship model in Switzerland that gives students more learning opportunities, fosters employability and increases mobility. It is a new program and less demanding than the 3-year apprenticeship programme. One remark is that also the new system is not aimed at supporting the less able student (op cit). The study of Nielsen and Tanggaard Pedersen (2011) is about the medieval apprenticeship system that disappeared because of mass schooling and industrialization. It is about integrating learning and production in small local units. They suggest to go back to the craftsmanship system with one master, a few apprentices and many journeymen. According to their opinion this seems to be in line with the demands of the postmodern world. The study of Pfeifer, Schönfeld and Wenzelmann (2011) is about the rule for companies in Germany that they are free to make the apprenticeship specific for their own company. They found that only 12% of the apprenticeships have a firm-specific component; there is a tendency that if the firm size increases, the training gets more specific. Apprenticeships are mostly seen as a way to gain broad knowledge and skills. This is good for the transferability. Important is to note that in general politics stimulates the apprenticeship system and the development of skills (Meredith, 2011), and that the examination is not only based on knowledge but that skills are also taken into account (Meredith, 2011; Akomaning, Voogt & Pieters, 2011).

Duality and apprenticeships

Austria's VET system comprises a fulltime school-based VET program and an apprenticeship program. They are independently developed and compete with each other (Lassnigg, 2011). The government, trade unions and employers influence the developments in VET. Further crucial factors influencing the school system are centralized federalism, the privatization of large organisations, and accession to the EU (Graf, Lassnigg & Powel, 2011). The apprenticeship program has lost the competition regarding quality and reputation. This is because of the big differences that occur between apprenticeship places and the lack of support students get in the companies. The apprenticeship program is not appropriate anymore to lead students to good job opportunities or further education. Austria is not the only country that has problems with its dual system of VET and with problems around apprenticeships. Henning, Loeb & Berglund (2011) reported that Sweden just introduced their dual system, resulting from a political decision by which it was tried to meet the wishes of the 15-year old student population for a more practical or a more theoretical form of education. According to the authors the system now looks like the way it was before 1990 and teachers are not well prepared for teaching the new programs. Apparently there are many differences between schools/teachers and the authors criticise the idea to let students at the age of 15 choose for either a practical or a theoretical educational trajectory. Molgat, Deschenaux and LeBlanc (2011) are sceptical about the VET system in Canada as well. They describe the situation by saying that there are many differences between the regions Quebec and Ontario, and that it seems that students have diverse reasons to leave school without a diploma. Students have the feeling that the education does not fit their demands and employers do not always care for a diploma. They hire students without a qualification and do not stimulate them to still get their diploma. Students and parents do not see the value of VET and getting a degree. In the opinion of the authors the government needs to pay attention to this problem, stimulate qualification processes, and do this in conjunction with the labour market. It is reported that in Australia VET does not have a good reputation either. They observed that there are not many real VET-teachers and other education programs get more priority, which they think is bad for the quality of VET. VET should be seen as a complete education form and get more attention. Luckily many students already see the value of VET but it is important that the status of VET rises. The study of Juul & Jørgensen (2011) shows that in Denmark there is a bit more optimism about the dual system; duality and self-governance are the most important characteristics of the VET-system there. This system necessitates a good relationship between the labour market and educational organizations. The authors contend that self-governance provides more apprenticeship places than if the government would have the responsibility for this issue. In total 33% of the youngsters are in the VET system and it is profitable for the government because interns are paid by the employers. The authors note that if in the future the amount of apprenticeship places drops the government needs to intervene. Maybe they will then choose to shorten the apprenticeship phase, give students the opportunity to go on internship for a shorter period of time and keep them longer at the schools; for now the authors conclude, the self-governance system works fine for them.

Preparations and support

Researchers agree that students need to be well prepared before they start with their apprenticeship (Deitmer, 2011; Fillietaz, 2011; Köth & Lecamus, 2011). Students need a clear view of their own interests and expectations, have an appropriate knowledge base and make clear appointments with the employer (Deitmer, 2011). Good communication between students, teachers and employers is also very important (Deitmer, 2011; Eraut, 2011; Kammermann, Stalder & Hättlich, 2011; Fillietaz, 2011; Akomaning, Voogt & Pieters, 2011). Tutors from schools need to visit the companies (Eraut, 2011), the apprenticeship model needs to be accepted by both students and employers and there needs to be a link between students interests and the developments at the labour market (Kammermann, Stalder and Hättich, 2011). Students can learn a lot in internships but they need proper support, from a coach in the company but also from their

schools (Deitmer, 2011; Poortman, Illeris & Nieuwenhuis, 2011; Fillietaz, 2011). Tutors at the company should be trained to guide the students, but companies already find that guiding a student is time-consuming already and they tend not to invest more time and money in training tutors (Fillietaz, 2011). Tutors should be able to observe learning progress and to detect non-learning and react on it (Poortman, Illeris and Nieuwenhuis, 2011). Apprenticeships should be beneficial for both the student, the school and the company (Deitmer, 2011; Kammermann, Stalder & Hättich, 2011; Meredith, 2011; Smith, Comijn, Kemmis & Smith, 2011).

Experiences with apprenticeships

Teachers, students and employers all have their own view on apprenticeships. Most research is about the experiences of students. In general, students are positive about their apprenticeship (Jourdan & Huchette, 2011; Köth & Lecamus, 2011; Jaarsma, Maat, Richards & Wals, 2011). They like to have some guidance in the company and also some guidelines to help them work on their tasks independently (Jourdan & Huchette, 2011). The experiences they have are context/company depended.

Jaarsma, Maat, Richards and Wals (2011) studied the apprenticeships in the automobile branch in Ghana. There is a very open learning environment where apprentices are confronted with all the materials; car parts are everywhere. There is a strictly hierarchical system, students start as junior, and how closer they get to the engine the bigger their status. This depends on the years of their experience but also on their skills. According to the authors, the biggest effort is the way the student deals with the learning environment. The biggest challenge is how the efforts of school and apprenticeship can be combined in one learning process. Guile (2011) discussed apprenticeship learning in the aircraft engineering industry. The curriculum is designed in a way that students first must gain knowledge and later on they have to use this more and more in practice. This combination is very important and the development of their skills must be supported as good as possible. Guile sees apprenticeships as a social model of learning and not as a model that is age or phase specific. The study of Gurtner, Cattaneo, Motta and Mauroux (2011) is about the extent to which apprentices in a garage ask questions and what these are about. It appears that apprentices become more and more effective in asking questions, but that seeking help at the workplace contributes more to their learning than just asking question. In the last two years of their study students ask more questions than in the first two years. They also ask experts more often. The authors recommend that companies should stimulate the apprentices to ask questions.

Hytonen, Hakkarainen & Palonen (2011) did research about the socialization of young diplomats. During their training period it is very important that they socialize in the network at their workplace. Within this community they get their own tasks and responsibilities, which differ between; their position in the community also differs. This can be caused by differences in gender, social style, expansive nature of the workplace or the community as a learning environment. Taylor and Freeman (2011) report that there is an apprenticeship program with which students can already start in their last year of high school. This is a good start but not all students finish education. The authors found that also in this case this is strongly related to the educational level of the parents and to the organisations in which they do their apprenticeship. Sometimes employers think it is more important that students work hard than that they get a diploma. The authors conclude that disadvantaged students need more support and formal and informal learning should be better aligned.

Doing an apprenticeship in a different country, which is getting more and more popular, is more complex than in the home country. Köth and Lecamus (2011) studied study exchange visits from Germany to France. Students indicated that their preparation was not sufficient. They stated that they need more language support and there should be more attention for the terminology in French. The authors found that students learned a lot during their apprenticeship, and that the language barrier was not a real problem; students gain self-confidence, learn a lot about the

culture and language and sometimes they even get a job guarantee. The authors conclude that it is difficult to describe all benefits of an apprenticeship abroad; it is best to ask the students themselves.

Perceptions of teachers

Verdu & Huchette (2011) did a study on French teachers, who state that there is not enough interaction between stakeholders and that this causes problems. Tasks of apprentices rarely meet the expectations of the school, there is not enough consistency between the school and work environment, students do not get enough guidance and their tutors are not prepared for their role. The authors observed the need for more interaction between the school, the employer and the student. Teachers see the apprenticeship as a place in which the students can get an introduction in their profession and where they can show some of the knowledge they learned at school. The authors also think the link between theory and practice should be improved. Huchette (2011) notes that apprenticeship schemes should be better integrated in the curriculum.

Views of employers

Virolainen, Stenström and Kantola (2011) pay attention to the view of employers on internships. Apprenticeships are mostly student-based, students are to ones who have the contact with the companies, which makes it hard for employers to develop a good relation with the educational institutes. As a consequence of that it is more difficult to enhance the apprenticeship learning as a learning experience. The authors argue that theory and practice should be aligned well in the curriculum. Employers want a forum for reflection on their relation with the student, discussion on curriculum aims and the development of the assignments. The authors conclude that there needs to be a collaborative framework and there has to be a model for collecting the opinions and reactions of employers as input for quality management and strategic planning.

Conclusions and suggestions for further research

Based on this review and our extensive experience with VET research since the 1980s, we can say that VET research has grown and that colleagues in European VET research are in a vibrant community and in a collective learning process, which is promising, but more can be done.

If we look at VET research from a critical perspective, we have to say that:

1. despite the large amount of VET research, it is quite diverse and fragmented;
2. much VET research lacks theoretical and empirical foundation; the dominant research methods are case and desk studies and explorative and analytical studies. There are hardly any experiments and intervention and design-based research studies;
3. there are various urgent topics for further research, which are not being addressed.

We observe that there is little convergence of theories and that there are many mini-theories, that there is little consensus about definitions, little operationalization of concepts in the direction of practice and empirical data collection, no evidence-based professional practice in the sense that research findings are not binding for practice, and there is a huge divide between research technical quality and relevance of VET research.

Until now there is no literature that addresses the main components of VET in a comprehensive way, amongst which the VET system, VET administration, VET policy, management and

organization of VET schools and training sites, VET curriculum development, learning and instruction in VET contexts, VET media and testing, and VET teacher education and professional development. Maybe that is also too complex and comprehensive, but some level of aggregation and integration could be helpful in our view. One could also argue that developing 'robust lines of research inquiry' (Sawchuk, 2011) would be sufficient. In a sense, the research themes and topics we presented above can also be perceived as such lines.

We have the following suggestions for further research on the themes that have been reviewed in this contribution.

- VET and society

The research reviewed in this theme is about the role of education in society. The research we reviewed here focussed on cultural issues, career guidance, partnerships and cooperation, and drop outs. It also touched upon personal development and lifelong learning. Other topics that can be interesting for future research are topics like citizenship, social capital building, democratic participation and the way schools deal with multiculturalism and ethnical segregation processes. Lifelong learning could also be studied more intensively, especially regarding the question of how this can be implemented in companies (including SMEs), how motivation can be increased and what the societal effects of it are.

- VET policy, organization and management

The research on policy, educational organization and management in the research we studied is mainly about the problems with VET and the dual system in various countries, descriptions of educational policy in specific countries and the problems that occur at the level of institution management. There are many possibilities left for future research in this theme. For example on the influence of EU regulations and agreements on national and local education systems and practices. The influence of deliberate measures and the efficacy of design rules on the quality of vocational education and training is an important issue in this respect as well. Research on improving weak schools, data-driven activity planning and results-oriented working in schools is also important. Furthermore it is necessary to do more research on the attractiveness of VET for young people but also for the labour market. Further attention is needed for the perceived status of VET. Also management can get more attention: what is important for their productivity, how does this translate into quality management, and what opinions do they have regarding the educational system and policy making process?

- VET teacher education and teacher behaviour

As stated by researchers mentioned above, there is not enough attention for research on VET teachers. Suggestions for further research are numerous and are about the way teachers get motivated to become and to stay a teacher. They need to be asked for their opinion more often and it is also interesting to do further research on teacher roles and what can be expected of teachers. Teacher education itself should also get more attention, especially on how teachers learn and how this can be facilitated.

- VET Curriculum

Curriculum is a very broad theme and although many topics are discussed there are still lot of opportunities for future research. For example, there could be more research on the evaluation of competence-based education. Furthermore, the perennial gaps between the intended, implemented and attained curriculum need continuous research attention. Research about the cohesion and the design of the curriculum, as well as about the role of ICT also seems promising. The interaction between policy and practice, and the interpretation and implementation of curriculum products at school levels could also be very interesting.

- Learning and instruction in VET

Much research is done in the field of learning and instruction; nineteen articles we studied fell in this category. They focused on learning in the cognitive, emotional and social domain, on the balance between practical and theoretical knowledge and the transferability of this knowledge to other situations/contexts. The theme is very broad and there is still a lot of research that can be done, for instance on different types of learning and instruction in the VET context. An overview of best practices of learning environments in VET would also be interesting. Research on the role of VET teachers in facilitating learning processes in different situations can potentially also be very productive, even as research on the extent to which self-regulated and student-centered learning should occur in VET, how students deal with autonomy and responsibility, what the effects are of the environment on the student and why competence-based practice-learning leads to a higher effect on knowledge and skills than on competence gain. Further research on informal learning and on the recognition of informal learning is also desirable.

- Assessment and testing of educational achievement in VET

Assessment is a theme that does not get much attention in VET research at the moment. However, testing and assessment is an industry in itself, and worldwide there is a colossal volume on research on it. More research on this theme is essential to improve the quality of VET, and thereby the quality of learning processes and results in VET. Links can be made with the field of computer-adaptive testing or other media applications. VET-teacher competence assessment can also get more attention. Again, this can be related to research on general teacher education and professional development. One of the studies concluded that assessments need to be standardised but this is quite controversial. Longitudinal studies should show whether standardized testing in VET is cost-effective and has more prognostic validity. In that research selection processes and career development should be included. Furthermore, research on classical test theory and item-response theory can be linked to VET, as well as research on the effectiveness of feedback.

- Apprenticeships/internships/workplace learning

This section showed that the research on apprenticeships focused on the availability of apprenticeship places, the apprenticeship system and the experiences and perceptions of especially the students. There should also be more attention for the perceptions of teachers and employers. The experiences of the students are mostly positive but it is also important to study the experiences of the other stakeholders. It is also interesting to analyse the motivation of students to do a certain apprenticeship and to look at ways in which they can manage their own learning process at the internship place the best. Another point of interest is the cost-effectiveness of apprenticeships, for students but also for schools and employers. In addition to that research could also focus on quality features of apprenticeship systems and their impact on learning and career development. The programs should be followed over a longer period of time.

As stated, a lot of VET research is being presented and published. Based on this review, research priorities we see are aimed at improving VET vocational teacher education and professional development, reaching demotivated youth in VET, prevent drop-out of VET, HRM in VET, competence modelling and assessment in VET, entrepreneurship and education provided by VET, innovation education in VET, and the relationships between the corporate, national and individual perspective on VET.

Next to that we have various topics that are hardly or not represented in the selection of papers we reviewed, but which deserve ample attention:

- VET history;
- VET research methodology;
- Studies on professions and occupations and education in the professions (Higher Vocational Education);

- Studies on the organisation of work and consequences for VET;
- VET impact studies;
- Issues regarding VET and economic sector development;
- Regional innovation by VET;
- Longitudinal learning trajectories/upward education mobility in the VET column;
- Pedagogical content knowledge/VET research in disciplines;
- Education media research, including online learning;
- International educational development cooperation.

We recommend that studies in these fields will be initiated and presented, as these are timely and important.

Finally, in terms of VET research policy development and general VET research planning we strongly believe that research should address pressing and relevant problems in educational practice, policy and politics, and that practice- and policy-oriented and fundamental research studies should be combined to solve these problems. It would be quite detrimental for both research and practice if the field of VET research would continue to be fragmented as it is.

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Appendix - Studies included in the review by author(s), research focus, educational level, theoretical framework and research strategy

Author(s) and year	Research focus	Educational level	Theoretical framework
Akomaning, Voogt, & Pieters, 2011	Internships and the perceptions of stakeholders	VET and higher education	School-industry collaboration internship placements
Avis, Canning, Fisher, Morgan-Klein, & Simmons, 2011	VET system of England/Scotland and the role of teachers	Vocational Education Teacher Training	/
Avis, Wright, Fisher, Swindella, & Locke, 2011	The role of teachers	Further education	/
Bank, & Retzmann, 2011	Training needs of economy teachers	Lower secondary education	/
Baqadir, Patrick, & Burns, 2011	Gap between what employers and graduates want (culture)	Vocational education	/
Bathmaker, & Avis, 2013	Professionalization of teachers	Further education	Teacher professionalism
Beusaert, Segers, & Gijsselaers, 2011	Personal development plans in companies	/	Personal development plans
Bicer, 2011	Turkish VET system	Vocational and technical education	/
Burchert, 2011	Learning fields, learning transfer	Initial vocational education	/
Canning, 2011	Reflecting on teaching	Further education	Reflective practice
Cattaneo, 2011	Costs/benefits of getting a PET degree	Professional college	/
Cendon, 2011	Knowledge development in universities	University	Production of knowledge, refl practice, action research
Clark, Zukas, & Lent, 2011	Transfer IT graduates to the workfield	Higher education	Transition from university to
De Groot, van den Berg, Endedijk, Van Beukelen & Simons, 2011	Design principles	Formal education	/
Deissinger, Heine, & Ott, 2011	VET systems and European policy	Vocational education/further education	Traditions/learning cultures, qualification frameworks
Deitmer, 2011	Relation between praktika and theory	Vocational and higher education	/
Dietzen & Wünsche, 2011	Competition VET/university	Initial and advanced vocational	/

	employees	training	
Do Paço & João Palinhas, 2011	Teaching entrepreneurship to young children	Primary school	Entrepreneurship education, Teaching children,
Eraut, 2011	Quality of long term apprenticeships	Higher education	/
Filliettaz, 2011	Collective guidance at workplace learning	Upper secondary VET education	Social theories of learning, guidance as an interactional accomplishment
Folvarochnyi, 2011	Professional teacher training in Ukraine	Higher education	/
Fox, Wilson & Deaney, 2011	Perceptions of beginning teachers	University/ initial teacher education	/
Franz, 2011	Perspective of teachers/ management on knowledge economy	General adult education	/
Gale, Turner & McKenzie, 2011	Roles of teachers in Higher/further education	Higher education, further education	Communities of praxis
Geel & Backes-Gellner, 2011	Occupational mobility between skill clusters	/	Skills/weight approach, occupational mobility
Geiben, & Grollmann, 2011	Quality of VET systems	Vocational education	/
Gekara, Bloor & Sampson, 2011	Computer-based assessment in maritime education	Maritime education and training	/
Gibbs & Maguire, 2011	Relation between therapy and learning	Vocational education	/
Graf, Lassnigg & Powell, 2012	Austrian VET system	Secondary and higher education.	/
Guile, 2011a	Apprenticeships as a model of social learning	Vocational higher education	/
Guile, 2011b	Interprofessional project work	Professional, vocational and workplace learning	/
Gulikers, 2011	Task authenticity and context authenticity in assessments	Prevocational education	Authentic assessments
Gurtner, Cattaneo, Motta & Mauroux, 2011	Help seeking behaviour of apprenticeships	Vocational education	Learning through work, self-regulated learning, mobile communication
Heatley, Allibone, Ooms, Burke, & Akroyd, 2011	English as second language	University	hidden expectations, cultural differences, feedback
Henning Loeb & Berglund, 2011	Apprenticeship track in Sweden	Upper secondary education	/

Henriksen, 2011	Problem based learning in universities	University	/
Hetzner, Gartmeier, Heid & Gruber, 2011	Influence of errors, reflection and problem solving	Workplace learning	Reflection in the workplace, a towards errors
Hof, Strupler, & Wolter, 2011	Becoming a teacher in Swiss VET	Vocational education	Self-selection and career chan
Hofmaier, 2011	Evaluation tool for problem based learning	University	/
Hua, Harris & Ollin, 2011	Student autonomy in China	Higher vocational education	Communication key skills and student-centred learning
Huchette, 2011	View of teachers on apprenticeships	Higher vocational education	/
Hughes, & Hughes, 2011	social capital in the deaf community	Vocational education	Human capital and social cap
Hyland, 2011	Mindfulness, feelings and emotions	Vocational education	/
Hytönen, Hakkarainen & Palonen, 2011	Socialization to networked professional cultures	Higher education	/
Ingleby, 2011	Role of mentoring	Post-compulsory education and training initial teacher training	PCET ITT mentoring
Jaarsma, Maat, Richards, & Wals, 2011	Materiality in apprenticeship learning	Apprenticeships are independent of the school system	/
James, Guile & Unwin, 2011	Knowledge based economy	Vocational education and higher education	/
Jeffrey, & Brunton, 2011	Framework for communication management competencies	/	Competencies, mapa model
Jørgensen a, 2011	Drop outs in Denmark	Education	/
Jørgensen b, 2011	Role of teachers in transformative learning	Continuing education	/
Jourdan, & Huchette, 2011	Students opinion on what they learn from work experience	Secondary VET education	Learning in the workplace
Juul & Helms Jørgensen, 2011	Dual and self-governance system, VET in Denmark	Vocational education and training	
Kämäräinen, 2011	Problem based learning, comparative analyses	Higher education/ universities	/
Kammermann, Stalder, & Hättich,	New 2 year apprenticeship model	Lower secondary education	Employability

2011

Kemmis, & Engstrom, 2011	Perceptions of teachers in Austria and Sweden	Vocational education and training	Teaching in VET
Khaled, Gulikers, Biemans & Mulder, 2011	Learning outcomes, practical simulations	Vocational and higher education	Powerful learning environment Learning outcomes
Kimmelmann, Nicole, 2011	Vocational literacy	Vocational education	/
Köth & Lecamus, 2011	Foreign apprentices in aerospace industry	Initial vocational education	/
Kupper & Kleijn, 2011	Monitoring innovation policy in green education	<i>Vocational and professional education</i>	/
Kyndt, Govaerts, Dochy & Baert, 2011	Learning intentions of employees	/	Low qualified employers, fact influence learning intentions
Laginder & Stenøien, 2011	learning by interest in dance and crafts	Informal learning	/
Lasonen, Cools & Teräs, 2011	Chances for migrant woman in education and work	/	/
Lassnigg, 2011	Competition within the dual VET system in Austria	VET system	/
Lau & Kan, 2011	History of the school system of Honk Kong	Prevocational and secondary technical education	/
Lester, 2011	Evaluation of the qualification and credit framework in the UK	Further education	Qualification credit framework professional qualifications,
Lindberg, 2011	Role of mathematics in education	Vocational education	Mathematics in the workplace
Lindorff, 2011	Skill gaps in Australian firms	VET education	/
Lübcke, 2011	Evaluation of videoplattform	Vocational education	/
Margeviča & Grinbergs, 2011	Sustainability in Letland	Vocational education	cooperation
Marks-Maran, 2011	Transfer learning, learning fields	Vocational education	/
McGinley & Grieve, 2011	Communicative interaction in educational environments	Secondary education	Learning, communication, organizational culture
McLaughlin & Mills, 2011	Dual parallel qualification system	Vocational and higher education	Collaboration models

Meredith, 2011	Importance of apprenticeships/ school system/view of employers	Post-secondary	/
Messmann & Mulder, 2011	Innovative work behaviour	Vocational college	Innovations and work context
Minnaert, Boekaerts, de Brabander & Opendakker, 2011	Computer based collaborative learning	Secondary vocational education	Collaborative learning, ICT
Misra, 2011	Role of teachers in VET	VET education	Evolutions and present trends Europe VET
Molgat, Deschenaux & LeBlanc, 2011	VET system in Canada	Secondary VET education	/
Morton, Collins & Eaton, 2011	Stereotyping, culture/gender	Vocational education	/
Mueller & Wolter, 2011	Consequences of being different on getting an apprenticeship or work	Further education and working pathways	/
Mulder, Eppink, Akkermans, 2011	Competence based education in East Africa	Secondary agricultural-vocational education, university	Competence based education
Navas, Marhuenda & Abietar, 2011	Social enterprises and social capital building	/	/
Nederstigt & Mulder, 2011	Competence based education in Indonesia	Higher education	The Matrix of CBE and a Comparative Education persp
Nielsen & Tanggaard Pedersen, 2011	Medieval apprenticeship system	Vocational education	Knowlegde development, lear theory, learning in profession
Nikolai & Ebner, 2011	School systems in Switzerland, Austria, Germany	Vocational training and higher education	Policy position of firms, VET qualifications
Normand, 2011	Lifelong learning policy	Further education	/
Oonk, Beers, Wesselink & Mulder, 2011	Roles and tasks of teachers	Higher education	/
Page, 2011	Resistance of first tier managers	Further education	/
Pfeifer, Schönfeld & Wenzelmann, 2011	Firm specificity of apprenticeships	Vocational education	General and firm specific skill movers/stayers, investments
Polesel & Clarke, 2011	Value of Australian VET education	Secondary education	/
Poortman, Illeris & Nieuwenhuis, 2011	Workplace learning processes and competence development	Senior vocational education	Workplace learning, social interaction, internal acquisition

Rocher, 2011	Relation between study/skills/job tasks/salary	VET graduates	/
Rohrback & Tiemann, 2011	Over qualification of employees, mismatching	/	Over qualification, polarization mismatching
Rose, 2011	Benefits of partnerships	Schools, sixth-form colleges, further education colleges, and special education institutions,	Partnerships
Rottermann, 2011	Success or failure in getting a VET diploma	Upper secondary education	/
Schaap, Baartman & de Bruijn, 2011	Learning at schools and at the workplace	Vocational education	Student learning in VET and workplace
Schaap, van der Schaaf & de Bruijn, 2011	Developing a personal professional theory	Senior secondary vocational education	Student learning, Contingent modelling
Schweri & Trede, 2011	Career choices of graduated healthcare assistants	Upper secondary VET	Career perspectives, career in and professional motivation
Siegenthaler, 2011	Aptitude test to predict success of apprentices	Upper secondary education	/
Smith, & Swift, 2011	Language of learning	Further education	/
Smith, Comyn, Kemmis, & Smith, 2011	Adoption of traineeships by employers	Further education/technical education	Traineeships, model/ quality/ effectiveness
Spierings & Meerman, 2011	Career of Human research graduates	Higher education	Acting as a professional
Stamm, Niederhauser, Leumann Sow, Kost & Williner, 2011	Factors of success for students with migration background	Vocational training	educational success of migrant social situation
Stenström, Nikkanen & Itkonen, 2011	Networking and partnerships	Vocational upper secondary, higher education, and adult education	Learning region and regional cooperation, Networking, competence development in SME
Strauss & Mooney, 2011	Literacy support model	Higher education/ university	/
Sturing, Biemans, Mulder & de Bruijn, 2011	Evaluation of competence based education	Senior secondary vocational education and training	Competence-Based Education
Tåhlin, 2011	Differentiation of work tasks, job complexity	/	Job complexity, organizational psychology
Taylor & Freeman, 2011	Youth attitude toward apprenticeship certification	High school	Changing work context
Van Bragt, Bakx, Teune, Bergen, & Croon, 2011	Withdrawal of continuing of students	Higher education	/
Van Esch & Petit, 2011	Social capital in the Netherlands	Secondary VET	Social capital

Verdu & Huchette, 2011	Perceptions of teachers on relation school/workplace	Secondary and university education	connective model of learning
Virolainen, Stenström & Kantola, 2011	View of employers on internships	Higher education	Guiding learners in aspiring connectivity.
Votava & Husa, 2011	Adult learning preferences	Initial and further education	/
Walden & Troeltsch, 2011	Apprenticeships/ Labour demand	Secondary VET	/
Wandeler, Lopez & Baeriswyl, 2011	Relation between hope/mental health/ competence development	VET education	Hope, personality development competency development
Warmington, 2011	Communication between organisations/ government/ employees	Leadership of VET	Activity theory, contradiction divisions of labour, Interagen Working
Waterfield, 2011	Theory/practice balance in pharmacy education	Vocational higher education	/
Wesselink, Boer, Oonk & Beers, 2011	Participation of educational institutes in regional ateliers	Pre-vocational secondary/ senior secondary/university	authentic learning environment
Willemse & de Ries, 2011	Assessment of workplace learning	Vocational education	/
Xiang, 2011	Differences between rural and urban China	Continuing vocation education	/