Education, competence and performance

On training and development in the agri-food complex

By Prof. Dr. Martin Mulder

Inaugural address by Prof. Dr. Martin Mulder on the occasion of his acceptance of the title of Professor in Education and Competence Studies at Wageningen University on 11 March 2004.

Dedicated to:

My father Jan Mulder (* 7-9-1917; † 13-9-1975)

My mother-in-law Gerritje Liefers-Potkamp (* 27-11-1926; † 31-10-1985)

Tempus omnia revelat.
(Time reveals all things.)

Concordia parvae res crescunt, discordia maximae dilabuntur.
(In harmony small things grow, in discord great things decay.)

We zullen nimmer althans niet gedurende de eerstvolgende menschenlevens geheel uitgeleerd zijn.
(We will never, at least not for many generations to come, have learned all there is to know.)
Dr. W.C.H. Staring, 1808 – 1877

1. Introduction

Honourable Rector Magnificus, distinguished colleagues, valued listeners. Most of you know the familiar line in investment advertising: 'Past results do not guarantee future performance'. First mountains of gold are promised; then the catch always follows in that little sentence. In the past few years I have often thought of how much that disclaimer from the investment industry pertained to me. It is generally not an easy task to become a full professor, but in my case retaining that title in Wageningen turned out to be nearly impossible. I have been with the university for five years since that time, having a new chair: Education and Competence Studies. I can now look back at an enervating but exciting period in Wageningen; there was certainly *never a dull moment*. The varied reactions I received in response to the initial plan to dissolve the chair of Agricultural Education were fascinating. My colleague, Professor Oskam, said: 'I would get a one-way ticket to Twente and never come back!' Another colleague, Professor Röling, assured me that I would still be here at retirement. Colleagues in the field of education studies were less diplomatic. One respected colleague, whose name I will not mention, said 'Use force, Martin, force! Find out where the Rector lives and wait for him!' Fortunately, I was able to disregard his advice, because otherwise I would not be standing here in this capacity before you today.

The press also showed great interest in the situation. One headline in the regional press portrayed my colleague Kok and myself as 'the lucky professor and the unlucky professor'. Frans Kok later told me in a private conversation that he disagreed with the headline. 'I wasn't lucky at all' he said, 'I just happen to be involved in an area that is very important for Wageningen, nutrition and health'. I had to agree with him, and for this very reason I proposed that the chair of Agricultural Education Studies be transformed via the chair of Education Studies into the chair of Education and Competence Studies. I am of course very pleased that this proposal has been honoured, because I think that the chair of Education and Competence Studies is of strategic importance for Wageningen. I base my opinion on three reasons, and they are as follows:

First of all, education is, in addition to research, the primary process that drives the university. And why should academic education not be based on academic research into that education? Or, as my colleague Van der Valk once wrote to me in an e-mail: 'As education farmers we often know exactly what to do to get the harvest in, without much knowledge about things like soil type and water systems (didactic principles, competencies and so on).' I know that a few colleagues were sceptical about the academic level of educational research. However, this scepticism turned out to be largely based on ignorance. It was perhaps not so well known within Wageningen University, but education studies has its own programme at the Netherlands Organisation for Scientific Research, its own KNAW-recognised research school and a whole series of international peer-reviewed scientific journals, a number of which are included in the lists compiled by ISI (the Institute for Scientific Information). Educational researchers in the Netherlands are organised in the Dutch Educational Research Association (DERA), in Europe in the European Educational Research Association (EERA) and the European Association for Research in Learning and Instruction (EARLI), and in the United States in the American Educational Research Association (AERA). The number of attendees at the annual AERA conference on educational research is generally about 12,000. Within the discipline of didactics there are also very interesting academic associations and international journals that are also included in the ISI lists, such as Cell Biology Education, University Chemistry Education, Research in Science Education, the Journal of Geography in Higher Education, the Journal of Planning Education and Research and Environmental Education

Research. As Wageningen scientists, we publish in these journals only seldom, use them very little or don't even know of them. I think that better use can be made of these resources within our university. There are also numerous associations, conferences and journals focused on agricultural education, including the Asia Pacific Association of Educators in Agriculture and Environment (APEAEN) (Tajima, 1995, 1997, 2000, 2004), the American Association for Agricultural Education, the Agricultural Education Division of the Association for Career and Technical Education (ACTE) (Moore, 2004), the Association for International Agricultural and Extension Education (AIAEE), the Global Consortium of Higher Education and Research (GCHERA) (in which Wageningen participates), the annual National Agricultural Education Research Conference, the Journal of Agricultural Education, the Journal of Agricultural Education and Extension and the Journal of International Agricultural and Extension Education.

Secondly, according to a policy paper published by the Ministry of Agriculture, Nature and Food Quality (LNV) in 2004, 'LNV … wants to strengthen the international competitiveness of the agri-business sector, using socially responsible entrepreneurship as a starting point. By paying greater attention to the environment, animal welfare *and* product quality, new market opportunities can be created. To contribute to sustainable entrepreneurship, the Ministry of Agriculture invests in research and innovation. Education and extension ensure that the results are accessible to everyone' as it is formulated in LNV policy in 2004, the plans of the Minister of Agriculture, Nature and Food Quality in summary (Ministry of LNV, 2003, 8). The ministry's vision is clear: it sees green education as a policy instrument. In addressing the educational sector, it has recently emphasised content-related educational innovation policy (see also Ministry of LNV, 2002). The policy paper entitled Vital and Together, LNV policy programme for 2004-2007 ('Vitaal en Samen, LNV-Beleidsprogramma 2004-2007', Ministry of LNV, 2003, 13) states that 'a multi-year programme of curriculum renewal will be established in 2004'. In a symposium on domain-oriented departmental learning held on the 11th of December last year, the new director of the Directorate of Science and Knowledge Transfer (DWK, a division of the Ministry of Agriculture), Ms. Hoekstra, made it clear that dialogue with all stakeholders is essential if the ministry is to realise its innovation policy ambitions. The emphasis in the ministry's policy is on renewal in education programmes. Within this process more thought should also be given to the new approach to learning (Simons, Van der Linden & Duffy, 2000) in which learners are given more responsibility to direct their learning process according to their own interests, and with social-constructivist competence development (Simons, 1999), including the recognition of acquired competencies and competence-based assessment, which is based more on insights from educational science than on content-related innovation. Based on about 30 years of experience in education and in conducting educational research, I believe that content-related innovation must always be embedded in the educational body of knowledge.

What does this say about the role of the Education and Competence Studies Group within Wageningen University? The answer is simple: no other group within the other universities in the Netherlands has been established with the main task of conducting academic research within and into green education in order to develop independent knowledge and play an advisory role with respect to educational policy and practice.

The third reason is that Education and Competence Studies holds a unique position within the agri-food complex. The development of and links within the agri-food complex is clearly outlined in the policy paper titled 'Food production and rural areas' presented in July 2000 by what was then the Ministry of Agriculture, Nature Management and Fisheries (Ministry of

LNV, 2000; see also Berkhout & Van Bruchem, 2003). The primary food sector is of course still very important for Wageningen, but the university's scope is now much broader. The primary products are delivered to the processing industry, and the products made there are sent by way of the retail sector to the consumer. Important actors in this chain are the supply industry, trade and logistics firms, financial institutions, the service sector, social organisations, sectoral organisations, the social midfield and governments. Within this broad spectrum, politics and society, research, development and education all play a part. And in this way the primary sector, industry, trade and services are all intricately connected. I envision the link between the agri-food complex and Education and Competence Studies to be as follows. Public policy with respect to the agri-food complex is directed toward system innovation, driven by the principles of sustainability, safety, security and high quality. It is a sector that involves a high degree of knowledge intensity. Education and competence development are therefore vital for the realisation of this innovation. Moreover, the knowledge economy is borne to a large extent by education, training, and development. The success of the Dutch agri-food complex is thus often attributed to the Dutch education system. Questions concerning which competencies are needed to respond and give shape to rapid and fundamental changes, innovations and transformations, and how these competencies should ideally be acquired are ones that can best be answered in Wageningen.

2. Competence-based Education

Ladies and gentlemen, in my introductory remarks I spoke about the position of Education and Competence Studies within Wageningen University. I stressed the importance of the scientific foundation for education policy and practice in education programmes in Wageningen, the value of green education as a sector of the education system that can contribute to the realisation of domain-oriented departmental policy priorities, and the need for competence studies in the pursuit of innovation and transformation within the agri-food complex.

I will now elaborate more on competence thinking, and then focus specifically on competence-driven education. I will then give a few examples of projects that the chair group has carried out in the past few years. Finally, I will present a number of education and competence themes that I believe offer very promising research opportunities.

2.1 The origin of competence thinking in education

Already in 2000, competence thinking was a central theme of study. The lecture I presented that year revolved largely around my research in the area of competence management and competence development in the business sector, particularly focused on large enterprises. Competence thinking was then seen as one aspect of human resource and organisation policy. In the meantime, however, competence thinking has also become a central theme in the debate over the development of vocational education (ACOA, 1999; COLO, 2002; Van Merriënboer, Van der Klink & Hendriks, 2002; Mulder, Wesselink, Biemans, Nieuwenhuis & Poell, 2003), teacher training (Klarus, 2003), scientific education (Nedermeijer & Pilot, 2000; Ministry of OCW, 2001)[1], and the professions (e.g. Roe, 2002), not only in the Netherlands but also abroad (Bjørnåvold, 2000; Descy & Tessaring, 2001; Rauner, 2002; Jenewein, Knauth & Zülch, 2002)[2]. Extensive efforts are currently underway to prepare for a competence-based qualification structure, competence-based professional profiles and the creation of competence-based training programmes. Even in the context of primary education,

competence education has been mentioned, for example in promoting the social competence of pupils.

Where does the idea of competence-based education come from? Competence-based education is not new; it is an innovation that was popular for some time in the 1970s before it lost favour due to its behaviouristic character. Competence-based education was literally crushed in the 1980s, but it has now made a comeback and is more alive than ever. How is that possible? I will give a short explanation.

Competence-based education was initiated in the United States, where Gerald Grant (1979) conducted a large study into competence-based education. The competence movement grew out of dissatisfaction with programmes in the post-secondary education system. Many colleges and universities offered programmes that had no clear objectives with respect to what the students were actually being trained to do or be. This was not only the case for education in the professions. Grant concluded already in 1979 that competence was a broad term, and that the competence-based education programmes that he and his colleagues had studied were very diverse. They varied with respect to their theoretical orientation (from indeed very behaviouristic to strongly humanistic), their scope (from generic to specific training), their intentions (to change or retain the structure of a profession), and their scientific focus (the role of the traditional science disciplines in the curricula varied, and could be either supportive, integral or subordinate). In other words: competence thinking was at that time also a general term for stimulating innovation, which encompassed many different perspectives and practices.

Grant et al. gave the following definition of competence-based education: ‘Competence-based education tends to be a form of education that derives a curriculum from an analysis of a prospective or actual role in modern society and that attempts to certify student progress on the basis of demonstrated performance in some or all aspects of that role. Theoretically, such demonstrations of competence are independent of time served in formal educational settings’ (Grant, op cit, 6). Thinking in terms of roles as the basis for competence analysis later received more attention and has proven to be a powerful concept in developing education programmes and methodologies for self-reflection and personal growth[3].

As I said before, competence thinking lost favour in the educational sector during the 1980s. It became primarily associated with behaviourism, mastery learning and modular teaching. Why has it made such a strong comeback, and how can we prevent this approach from ending up in another fiasco?

I think the following considerations have played a significant, although admittedly not exclusive, role in the reincarnation of competence thinking in education. Recognition has been growing of the need for education to be directed at developing skills, and not just at acquiring a diploma; the emphasis has to be on capabilities and not on qualifications. Capability is an important prerequisite for employability. Shifting the emphasis to developing capabilities will therefore improve the link between education and the labour market. Recognition of informally gained competencies and testing of these competencies outside of the educational system (De Roij van Zuijdewijn, Koen & Gielen, 2003) have also been important factors, not only in the Netherlands but also in various other European countries (Descy & Tessaring, 2001). The necessity to consider these options was created by the variety of training programmes offered to people who were unemployed, re-entering the labour market or transferring from other disciplines. These students believed that experience gained outside of

formal educational channels should be considered in the creation of individually tailored training trajectories. Moreover, there is also a public interest in recognising these informally gained competencies, as unnecessary costs can thus be avoided. Competencies are also important for functioning independently in the risk-society, particularly the capability to cope with constant change (see for sustainable development of learning capability, Van der Sanden, 1997). Competence thinking also appears to have made its way back into education in the United States (U.S. Department of Education, National Center for Education Statistics, 2002)[4].

2.2 Principles behind competence-based vocational education

Is the current concept of competence-based education the same as what Grant and others studied in the seventies? In my opinion, the answer is no. Since that time various new theoretical insights have appeared that form the foundation of the concept of competence-based education. I will explain which insights I think are important elements of this concept. I will limit the scope of my comments here to vocational education.

1. *Competencies as the basis of professional practice.* Beginning in the 1980s, developers of vocational education programmes leaned heavily on the results of job analyses (see Mantelproject, 1983). This eventually developed into a nation-wide qualification structure for vocational education. However, many job analyses, and the whole qualification structure itself, often evoked criticism. Critics pointed to the fragmentation in professional practice, and in the 1990's growing support was expressed for using a broader and more constructive view of professional practice as the foundation for developing training programmes. This led to the interest in critical job situations, competency profiles, and job pictures as the basis for training programmes.
2. *Curriculum integration.* Fragmentation was present not only in practice, but also in the curriculum. This led to calls for curriculum integration (Tanner & Tanner, 1995). It was believed that theory and practice should be more aligned with each other and that more related larger parts of professional practice should be used as the focus in curriculum planning. With this in mind, more emphasis has been placed in recent years on mastering core tasks. By bringing learning content and activities in line with these core assignments, the relevance of particular aspects of the curriculum for professional practice becomes evident.
3. *Competence assessments.* Already in the 1970s, support was expressed for testing the learning progress of students using transparent and criterium-based competence assessments (McClelland, 1973). In competence-based education, students' competencies are tested before, during and after the training programme. This makes it possible to exempt some students from following specific parts of courses, or to tailor the courses according to the students' own competencies or training needs. It also makes it possible to test whether the student has acquired the core competencies taught in the education programme.
4. *Competence development implies integration of knowledge, skills and attitudes.* An essential characteristic of competence development is the integration of knowledge, skills and attitude to ensure successful performance. Competence development coincides with critical reflection on the diversity of tasks and problem situations that is encountered in professional practice (Schön, 1983). Students must develop clear representations of the professional practice (Eraut, 1994). It is important that students

gather realistic experiences during job performance in professional practice in a meaningful context. The students' own experiences can be used as the starting point for structuring the training programme (Marquardt, 1999). Broadening and deepening of the experience can help students expand their competencies.

5. *A competence-development-based relationship between teachers and students.* In a competence-based learning environment, the student is considered to be part of the community of practice (Wenger, 1998) and he or she is seen as a junior-colleague rather than as a student or intern. Teachers act as coaches and as a source of information as they contribute through respectful dialogue to the student's knowledge structure. The work situation serves as a learning situation and stimulates authentic learning. Since work is often conducted in groups and knowledge is often gained through dialogue with others, it is important to let students regularly work together in teams (Tjepkema, 2002). This allows them to develop communication and cooperation competencies.
6. *Personal responsibility for competence development and entrepreneurial learning.* In designing programmes for competence development, it is important to support the learning process and, depending on the students' progress, to increase their level of responsibility (Van Merriënboer, 1997). This can be done by offering an exciting, powerful and inspiring learning environment that stimulates the students to utilise their talents and reach their full learning potential. The concept of entrepreneurial learning can also be used to increase the students' level of responsibility (Gibb, 1998).
7. *Personal competence development.* Competence development can be effectively and individually designed with the help of personal development plans and portfolios in which the development of competencies is documented.

The theoretical insights mentioned here vary in the extent to which they pertain exclusively to competence-based education. However, together they form a framework for the design of competence-based education. Parts of this framework have been studied extensively in other contexts and recommended for renewal and improvement of training and development.

The theoretical basis for competence-based education can be made more practical by applying the following principles:

- Identify the roles and critical situations students are likely to find themselves in after completing their education.
- In light of these situations, develop core assignments for the training programme that will form the guidelines for designing the curriculum.
- Monitor student achievement by means of assessments – or proof of capability – conducted by various evaluators. Assessment of knowledge, understanding and insight can be part of the proof of capability.
- Evaluate the student's pre-entry competencies before commencement of the training programme.
- Place learning in a recognisable and meaningful context.
- Link practice and theory. Encourage students to gain new experiences and to reflect on them.
- Integrate knowledge, skills and attitudes in the parts of the programme.
- Allow the students greater personal responsibility and self-management.
- Stimulate the teachers to fulfil their role as coach.

- Create the basis for continued competence development during the students' professional careers, with particular emphasis on the development of learning competence.

Current practice in vocational education is in some cases far removed from the image projected by these principles. Implementing competence-based education is indeed a very complex process that encompasses plenty of opportunities to make mistakes. What is needed to ensure that the development and implementation of competence-based education does not fail? I think it is important to gather all the expertise available in the Netherlands among teachers, professionals in policy and management, curriculum developers, advisors, test developers, researchers, and education scientists (Onderwijsraad, 2003a). In addition, good examples of competence-based education are needed, as well as analyses of their added value. Of course there will be variation in the central dimensions of the framework, but good examples, analyses and descriptions can help others design this kind of education and help them avoid potential problems.

2.3 Competence development and the knowledge economy

I have already mentioned today's knowledge economy, and the general understanding that we live in it and must further strengthen it (VNO-NCW, 2003). Whether this is actually the case, and whether this applies to the entire work force, is debatable[5]. What we know for sure is that just about 100 years ago compulsory education was adopted by our parliament (by chance though, because one opponent was not able to arrive on time to vote[6]) and there are now 500,000 students in higher education in the Netherlands.

Based on this picture of society, one could conclude that education must become exclusively focused on the transfer of knowledge. However, this type of education, involved in only disseminating information, has come increasingly under pressure in recent years. Society in the year 2004 is, after all, also characterised by inherent insecurity, and the need to be self-reliant, to make choices and take risks. This demands of young people that they determine their own course, make choices and dare to take risks. This is no small task, especially at a time when norms and values are no longer fixed, rules change quickly (sometimes in the middle of the game), information is often ambiguous and incomplete, and every citizen has to make his or her own choices based on (in traditional terms) a self-imposed sense of individual responsibility (Langeveld, 1971). The starting professional is thus basically thrown into the deep end with his or her own set of wishes and opportunities; which leads many people once they have reached their twenties or thirties to ask: What do I really want? What can I actually do? Who am I exactly? This scenario may sound familiar to many of you. In the past few months I have introduced this subject in various discussions and it is surprising how often it strikes a chord with students. Apparently many young people are faced with this issue. They are expected to take responsibility for the formulation of answers to questions they encounter along the way; and education from primary school on has an important role to play in preparing them for this role. Education should thus not focus exclusively on the acquisition of knowledge, but should facilitate the process of competence development among young people, so that they can gain the competencies required in society such as independence, daring and the ability to reflect. What we need are strong communities of competence that are formed during a student's school career.

This society-driven, and in my opinion compelling, argument for the importance of competence development is the reason that I have made competence thinking a central theme of the chair group.

Ladies and gentlemen, so far I have explained how competence thinking found its way into education, how experience was gained with this new approach in the 1970s, and how these initial attempts to apply the approach failed. I have also outlined what I believe are the most important principles of competence-based education and I have suggested that today's society expects education to play a greater role - one that goes beyond just the transfer of knowledge. Young people need competencies in order to successfully enter the labour market and find direction in their careers.

3. Examples of Education and Competence Studies

I will now give four examples of projects conducted by the chair group in recent years, which provide insight into the innovation of green education and which can contribute to the transformation of the agri-food complex. The first example follows directly from my previous points, as it deals with the development of competence-based green education. The second example focuses on designing inspiring learning environments for innovative entrepreneurs in horticulture. The third example deals with the promotion of life-long learning (Onderwijsraad, 1998; SER, 2002; Onderwijsraad 2003b) in the agri-food complex, particularly for graduates of senior secondary agricultural education (HAO), and the resulting consequences for green education. The fourth example is about educational innovation within Wageningen University itself. These are just examples, but together they give a good idea of how the chair group is trying to serve as a bridge between educational science and practice, particularly in education programmes and development in the agri-food complex.

3.1 Competence-based green education

The first project I would like to mention was aimed at the formulation and testing of design principles for competence-based green vocational education (Wesselink & Lans 2003; Wesselink, Lans, Mulder & Biemans, 2004). The principles of competence-based vocational education mentioned earlier were in fact largely derived from this project. The project is part of the chair group's research programme for the green secondary (VMBO, MBO) and higher (HBO) educational levels. Case studies conducted in secondary and higher agricultural education institutions showed how competence-based education programmes have come into being. The case studies led to the following insights:

- The relationship between competencies in the job profiles and the education programmes is not always clear.
- Sufficient collaboration is needed in formulating objectives and making agreements.
- It is difficult to establish core assignments because tension is inherent between content-matter thinking and practice-oriented thinking. The important thing is to bridge this difference in a productive way.
- The intake has to be clearly explained and should return later in the programme.
- The strong linkage in competence-based education programmes between education and practice is viewed as very positive.
- Teachers find the facilitating and coaching role needed to support competence development new and difficult. They fear that the learning process will become fragmented and that the students' potential will not be optimally utilised.

- Methodologies are needed to give the teachers a clear idea of the students' experiences in practice.
- Recognition of the competencies by students is limited.
- The students' response to independent study varies. Some enjoy it, while others would prefer more support from the teacher.
- Students find that they are too often confronted with the concept of competence, the added value of which is not clear to them.
- Too much bureaucracy presents a constant threat. If students are asked too often to fill in forms and write evaluation reports, they will eventually balk.
- Opinions vary with respect to the functionality of assessments. Teachers doubt whether enough is asked of the students in assessments, whereas students find this to be a pleasant way to be tested.
- Assessment is a more intensive way to test student achievement, and the additional workload for teachers must be taken into consideration.

My main conclusion based on these findings is that a good start has been made in the development of competence-based education, but we still have a long way to go. Our intention is to further study these insights and experiences with competence-based education within the broader context of all vocational education, and to link these findings with our research on training and development within organisations, including small and medium-sized businesses, and micro-enterprises. This link between education and practice is a logical reflection of the fact that learning trajectories are increasingly intertwined with and influenced by on-the-job learning. (Fischer & Rauner, 2002; Boreham, Samurçay & Fischer, 2002)[7].

3.2 Inspiring learning environments for innovative entrepreneurs in greenhouse horticulture

The second project, 'Inspiring learning environments for innovative entrepreneurs' (Kupper, Lans, Mulder & Biemans, 2003) is financed by the Innovation Network Green Space Agri-cluster and the Foundation for Innovation in Greenhouse Horticulture in the Netherlands. The project is focused on competence development among entrepreneurs in greenhouse horticulture[8].

Competence development of entrepreneurs predominantly takes place outside of formal training programmes and courses. In search of a support structure to promote non-formal learning (Coffield, 2000), discussions were held with innovative entrepreneurs and other professionals and a literature review was conducted. Based on these efforts, the researchers were able to identify four competence clusters, three types of innovative entrepreneurs, three types of change processes, and six inspiring learning environments that can provide support in acquiring the competencies needed to achieve the desired system innovation in the agri-food complex. These learning environments are called the horti-master class (the master who excels in his or her area of expertise instructs other professionals), the horti-clinic (for specific training), the horti-atelier (for creative expression), the horti-laboratory (for experimentation), the horti-academy (which offers an extensive range of multi- and trans-disciplinary training programmes) and the entrepreneur's café (where competitors learn from each other, learn 'coope-titively', and exchange information in a mutually beneficial way).

In regular education personal responsibility, self-direction, and self-regulation are highly valued. In this respect, continued learning of entrepreneurs and inspiring learning

environments can also be useful in thinking about the design of regular education. This brings us to the terrain mentioned earlier of entrepreneurial learning. The transition from traditional models of learning towards more entrepreneurial learning has been aptly described by Gibb (1998). It may come as no surprise that as the former chair of the Interdepartmental Commission on Entrepreneurship and Education of the Ministry of Economic Affairs and the Ministry of Education[9], Culture and Science, I consider entrepreneurial learning to be a very promising concept[10].

3.3 Brainport. Life-long learning in the Dutch agri-food complex

The third example is the Brainport project (Lans, Wesselink, Mulder & Biemans, 2003; Lans, Wesselink, Biemans & Mulder, 2004). This project was financed by the Directorate of Science and Knowledge Transfer of the Ministry of LNV and focused on graduates of senior secondary agricultural education (MAO). The objective was to determine what role agricultural training centres could fulfil in offering life-long learning, not through short courses but in the form of long-term learning trajectories. If this were possible, former students of these schools would benefit and the schools would have a new market. An important aspect in designing such learning trajectories is of course the demand of the target group. For this reason, in-depth interviews were conducted with the target group to identify learning needs and to discover what learning methods the group prefers. It is also important to know what motivations the target group might have for participating in various activities. This question was therefore also posed, and the most important motivation turned out to be personal development. Education institutions that want to initiate a programme of life-long learning will inevitably encounter a number of obstacles, however. For example, incongruence has been observed between the role teachers envision for themselves and the coaching and reflecting roles required of them by competence-based education.

Within this project new trajectories and ideas for life-long learning were also outlined and tested. Pilot projects included ‘From required spraying permits to integrated learning in crop protection’, virtual study groups (Letsgrow.com), study clubs of (G)LTO, ‘From supply-driven to interactive on-line agricultural business management’ (Ziezo.biz) and a demand-driven alumni network.

The latter pilot project formed the basis for an extension of the Brainport project. The objective is to study whether graduates of senior secondary agricultural education (MAO) are also interested in continued learning within alumni networks. Initial research results have been positive (Van Dorp, 2003): according to questionnaire results, alumni of agricultural training centres would welcome learning activities that contribute to personal development. They consider new developments in their field to be their most important learning need, and they see continued contact with both the agricultural training centres and other alumni as a good way to keep learning.

3.4 Educational innovation in university education

The fourth project, which has just recently been completed, dealt with educational innovation in university education (Mulder, Van Loon-Steensma & Broekman, 2004). This project was commissioned by the Environmental Sciences Group of Wageningen UR to study the experiences with educational innovation financed by its Board of Directors. The educational innovation was aimed at stimulating problem-based education (PBO), information and

communication technology in education (ICT) and, what is so characteristic of Wageningen University, integration /interaction of natural, technological and social sciences (NTSSI) (Bèta-Gamma Integratie/Interactie BGI) in education[11].

The aim of this project was also to share experiences regarding educational innovation. Educational innovation is often carried out by project teams, but communication of results between these teams is not always optimal. The exchange of experiences was facilitated through group discussions, interviews and a workshop. It was readily apparent that the participants very much appreciated this opportunity to exchange experiences. They believed that the content and design of renewal in education should be discussed more frequently among colleagues. In their experience, discussions focused too often on preconditions for change.

This project provided a number of important insights for educational innovation in problem-based education, ICT and NTSSI. Various general conclusions can also be drawn. In addition to conclusions regarding the organisation of and conditions for renewal (such as the mandatory character of the innovation, the tasks of the various actors, the evaluation of proposals and the financial aspects of projects), the most important general conclusions that can be drawn from this project are the following:

- Implementation of natural, technological and social sciences integration in education should receive greater attention, specifically with respect to testing, didactics and competencies of teachers. It would be good to initiate a programme aimed at integration of natural, technological and social sciences.
- Educational innovation pursued only within specific subjects is too narrow in scope. NTSSI and problem-based education are innovations that clearly have to be viewed from the perspective of life-long learning trajectories. It is impossible to acquire all of the desired NTSSI competencies within one subject. NTSSI is a learning process that has to be stimulated in various subjects over the entire breadth of BSc and MSc programmes. This requires clever planning and intensive collaboration.
- Competence development can only be partially programmed, because over the course of their education students will diversify and design their own learning trajectories according to their own needs. Due to the various entrance possibilities for students, it is now more important than ever to consider differences in pre-entry competencies.
- Educational innovation requires coordination of educational philosophy, objectives, content, organisation and testing. Change in one of the components has implications for all of the others.

4. Perspectives for the future

As noted earlier, the projects mentioned here are just examples. I could have highlighted other projects, such as the project on Profiles for Training Programmes in Purchasing financed by the NEVI Exam Foundation (Wesselink, Pagrach, Mulder, Bruijstens & Miltenburg, 2001) or the new projects within the continuing research programme ‘Competence development in food and the green sector’. These are three projects on, respectively, the development of competence-based education, competence-based testing and competence development of workers. These projects are designed around the theme of socially responsible entrepreneurship (Biemans & Mulder, 2003).

In the remaining portion of my lecture I will present the themes that I believe will allow the chair group's work to become further anchored within Wageningen University. This focus does not include the university teacher education programme or the skills training the chair group organises, both of which have flourished in recent years thanks to the concerted efforts of the instructors involved. Recently, in fact, the Visitation Committee for the university teacher education programme contended that Wageningen should retain the Orientation Programme for teacher education and even carefully expand it. This is currently being worked on. Moreover, some parts of the skills training have become required elements of nearly all degree programmes. Of course we will continue to foster our part in the teacher education programme and the skills training, and expand it wherever possible and desired. Our intention is also to conduct research on these topics focused on the competence development of teachers and students.

However, to further anchor the chair group's work within Wageningen University I believe we have to also choose topics that are content-related and that tie into Wageningen University's chosen thematic fields. I see five topics that are very promising: learning for sustainability, knowledge circulation, human resource management and development, education and international development, and improving learning processes. I will elaborate on each of these.

4.1 Learning for sustainability

From a global perspective, sustainable use of natural and human resources is of great importance for the quality of life on earth in the future (Pigozzi, 2003). Despite various attempts over the years, the large international sustainability problems have not really been solved. It is for this reason that the focus has shifted to education and that increasing support is being expressed for the integration of sustainability in the curriculum (Corcoran & Wals, 2004). The expectation is that competence development with respect to sustainability will lead to more socially responsible behaviour. In the past, the chair group focused a lot of attention on environmental education. Learning for sustainability and sustainability education contribute a number of important elements to the more traditional environmental education. Its scope has thus been broadened (with respect to both target group and themes) and its content has been renewed (in the sense of greater professionalism as well as in the design of learning processes).

The Dutch government has made a concerted effort in recent years to promote learning for sustainability and to apply the concept in various social contexts. In its recent policy paper 'Learning for sustainability 2004-2010' this position has been upheld and even further strengthened.

Research into learning for sustainability can be aimed at the analysis of conditions under which sustainability competence development can be promoted in various sectors (such as education, the business world, and the non-profit sector) and at various levels (local, regional, provincial, European and global). The research can also be directed toward analysing the cost-effectiveness of sustainability competence development compared to that of other instruments designed to promote sustainability (Wals, 2004).

This research can also be coupled with the new research programme 'Competence development in food and the green sector'. This is a programme in which, as I noted earlier,

the chair group has chosen to conduct competence-based research around the theme of socially responsible entrepreneurship[12]. It is important that our work on this theme be coordinated with the efforts of the working group Sustainable Development and System Innovation of Wageningen UR (Klep, 2004).

4.2 Knowledge circulation

The second theme relates to knowledge circulation. This theme has come more into the spotlight in recent years in the science and education policies of the Ministry of LNV (Ministry of LNV, 2003, 13). A DLO (Dienst Landbouwkundig Onderzoek) research programme on this theme is currently underway that is partly led by the Education and Competence Studies Group. It is not surprising that this theme is attracting so much interest, considering the high volume of research currently being devoted to various issues including food safety, sustainable production, nutrition in relation to health, genomics and rural areas[13]. The exchange of knowledge was at one time well organised within the agri-food complex. However, since the collapse of the traditional triptych of research, extension and education, the rise of neo-liberal social-economic politics and the coming into being of the post-modern society, knowledge circulation is no longer necessarily regulated and financed by the government. On the contrary, knowledge has become more of a competitive factor for individuals in the labour market, businesses within the economy, and for the Netherlands on the world market. Moreover, knowledge has increasingly become a commodity in itself. Private individuals, businesses and the government can no longer assume that knowledge is free for the taking; it has to be paid for. Consultancy and educational organisations have had to answer to a growing demand in recent years for an ever-increasing supply of knowledge. They have become important players in the open market for knowledge.

The term knowledge transfer is also often used to refer to knowledge circulation. It refers to the transfer of knowledge to the educational sector. The image thus created, of a one-way stream of knowledge from research to education is, however, not at all accurate. And the idea that this process can somehow be managed, as suggested for example by the term knowledge management, is also doubtful. The process of knowledge transfer is much too complex, as it involves many actors, many types of knowledge, and widely varying capacities to absorb knowledge. Furthermore, the image of research and education as two homogenous and relatively independent entities is false. If the relationship between the two is examined, for example, many links can be found. Both are to a large extent institutionalised, specialised, segmented and differentiated. Within the university, research and education are integrated (at least that is the intention), the education programmes are based on the latest findings of international research within the various disciplines, and students are taught how to conduct research. In many cases they participate in the programmes of the research teams. Within higher vocational education, the emphasis is more on the application of knowledge and students are less prepared for taking on research positions. This is even more the case within secondary vocational education, where the focus is almost entirely on the application of knowledge.

Research and education institutions, but also individuals within these institutions, function within networks, and are thus to a certain extent structurally dependent on each other. Without the use of research-generated knowledge, education would degenerate; and without good education, research would no longer be supplied with new highly educated professionals.

The network relationship between research and education is demonstrated, for example, by joint projects of the university and other educational institutions, the production of textbooks by researchers, the university teacher training programme, in which students are introduced to a discipline and are prepared for their role as teachers, continuing education courses, in which new knowledge is provided for teachers, knowledge exchange within professional teachers' associations, the use of the secondary school campus (VWO campus) as an interface between university preparatory education and the university, the Service Plan of Wageningen University, teachers who participate in research projects, etc. Organisations such as the Knowledge Centres for Vocational Education and Business, the National Pedagogical Centres and the Innovation and Practice Centres also have an important role to play in the flow of knowledge between research and education.

These outside actors are not only important for the distribution of knowledge gained through research; they also have an important influence on research programming and the design of specific research projects (what is or is not possible is often determined by, or in consultation with, those who will be putting the knowledge into practice). This is why it is better to speak of knowledge circulation, even though this creates the image of knowledge that is pumped around in circles without being changed. However, learning psychological research and epistemological theory have revealed that knowledge is developed or constructed. Knowledge cannot be simply copied from one person or organisation to another. Knowledge construction would therefore be a more accurate word for the process the terms knowledge flow and circulation refer to. As this knowledge construction actually always occurs between individuals or knowledge holders, it would be even better to speak of interactive knowledge construction.

4.3 Human Resource Management and Development

I have referred already a number of times to entrepreneurship, entrepreneurialism, entrepreneurial learning and socially responsible entrepreneurship. This theme ties in with my experience in the fields of corporate training, human resource development (HRD) (Harrison & Kessels, 2004), performance improvement and human resource management (HRM), and more specifically competence development in organisations (Mulder, 2002) and learning organisations (Tjepkema, Stewart, Sambrook, Mulder, Ter Horst & Scheerens, 2002). It is thus not surprising that I see human resource policy, management and development, including competence development of entrepreneurs, as an area that can be developed further in Wageningen. This is apparently also necessary, considering the scaling-up of enterprises in the agri-food complex, and the consequent increasing importance of HRM and HRD[14]. I was therefore pleased by the conclusion expressed in the verbal report by the Visitation Committee for business studies that HRM was lacking in the business education programme within the larger Business and Consumer Sciences programme. Based on my experience with human resource development in the business sector, I was indeed surprised to find that very little attention was paid within this programme to HRM and HRD. Surely every business graduate will be confronted at some point in his or her career with issues related to human resource management, such as recruitment and selection of personnel, assessment and remuneration, and training and development. This became clear to me too during my role as member of the Visitation Committee for technical business studies. It is interesting to look not only at HRM and HRD practice in large enterprises, but also in micro-enterprises in the agricultural and horticulture sectors (Skinner, Pownal & Cross, 2003) and in on-the-job learning (Bierema & Eraut, 2004). I therefore look forward to working together this year with the Management

Studies Group and in particular with my colleague Onno Omta to develop proposals for education programmes focused on HRM and HRD in agribusiness.

4.4 Education and international development

The fourth theme the chair group will focus on is global competence development; by which I mean general and vocational education in developing countries (UNESCO/ILO, 2002; Maclean, 2003). Being in Wageningen, it is almost impossible to lose sight of the non-Western side of educational studies (Macguire, 2002; Wals, Caporali, Pace, Slee, Sriskandarajah & Warren, 2004). However, focusing on education within the scope of international development is not a self-evident activity for educational studies in the Netherlands. There is, for example, no division within the Dutch Association for Educational Research that focuses on education in developing countries, or even, more generally, on the internationalisation of education. Of course the work carried out within the various existing divisions is international in scope, but that is quite different from making international development the specific subject of study.

The chair group in Wageningen has for many years shown considerable interest in education in developing countries and the intercultural aspects of education. The chair group therefore also offers courses such as 'Learning and working in a different culture', and 'Education in developing and changing societies'. Current research projects include themes such as needs assessment and education for rural development in Gambia (Van Dam, 1983), competencies of rural development workers in the fight against HIV/Aids (Brinkman & Witteveen, 1998; Witteveen, Brinkman, Mongi & Baars, 2002), needs assessment, competence profiles and HRD for trainers in agriculture in Iran (Chizari, Karbasioun & Lindner, 1998; Karbasioun & Mulder, 2004) and Korea (Shim, 2000), gender inequality in general primary education in Uganda (Doris Kakuru) and, in collaboration with the Technology and Agrarian Development Group, competence development for participatory learning, and the transformation of education and learning in higher agricultural education (Paul Kibwika).

I am sure no further arguments are needed to promote the idea that the theme of education in developing countries is an important part of what Ismail Serageldin rightly calls Wageningen University's responsibility to contribute to international development. Bruns, Mingat & Rakotomalala (2003) provided an overview of the global initiative to provide primary education to all children in the world; a goal that is still far beyond reach in many regions. This goal has been proclaimed often, for example during the 1990 World Conference on Education for All in Jomtien (Thailand) and during the World Education Forum in Dakar in 2000[15]. Universal completion of primary education and gender equality in primary and secondary education were also included that year in the Millennium Development Goals. Technical vocational education (Atchoarena, 2002) and agricultural education can also play an important role in international development, as integrated elements of primary and secondary education but also as part of vocational education. In my opinion, too little thought is being given to the potential contributions of agricultural education to rural development in the third world.

4.5 Improving learning processes

The last theme that I believe offers interesting opportunities for the chair group is improving learning processes of students in the Wageningen disciplines. This topic brings us back to

where I began this address: the educational scientific foundation for academic education at Wageningen University. Many subject areas lend themselves to interesting research into the learning of complex cognitive skills, with or without ICT support (Dondi, Barchechat, Kastis, Kugemann, Twining, Stephenson & Aceto, 2002; Lutgens & Mulder, 2002; Veldhuis-Diermanse, 2002; Verburgh & Mulder, 2002; Van Oene, Mulder, Veldhuis-Diermanse & Biemans, 2003). A number of research projects are being conducted here in Wageningen and elsewhere into the learning of complex cognitive concepts (De Jong, Kanselaar & Lowyck, 2003; Van Merriënboer, 1997). Within the domain of technology and nutrition a number of PhD projects have been initiated on the design of digital learning materials (Aegerter-Wilmsen, Hartog & Bisseling, 2003; Diederen, Gruppen**,** Hartog, Moerland & Voragen, 2003; Diederen, Gruppen, Voragen, Hartog, Mulder & Biemans, 2002; Van der Schaaf, Vermue, Tramper & Hartog, 2003). But even more is possible. The chair group has initiated contact with the chair groups of my colleagues Van Boekel (Product Design and Quality Management) and Van der Valk (Land Use Planning) and I see interesting possibilities in other scientific disciplines. The results of this type of research can be used to improve the learning processes of students and to thereby help them progress further in their own scientific disciplines. This seems to me to be particularly desirable for the link between the Master and PhD programmes and cutting edge research. I look forward to investigating in the coming years possibilities for co-promotions, together with my colleagues in Wageningen, research that balances on the intersection between their disciplines and the learning of students within those disciplines.

In summary, I see five thematic fields within which we in the chair group can further specialise: learning for sustainability, knowledge circulation, HRM and HRD, education and international development, and improvement of learning processes. Obviously, there is plenty to keep us busy for the coming five years. One danger posed by this wide range of subjects is a lack of focus. However, I believe our concentration on the core theme of competence development will allow us to stay sufficiently focused.

4.6 Towards greater depth and a broader international perspective in competence research

At this stage it is important that research into competence development be broadened in a global sense and that it become more in-depth. In connection with these objectives, as of July of this year I will be working for one year at Cedefop in Greece. Cedefop is the European Organisation for the Development of Vocational Education (Centre Européen pour le Développement de la Formation Professionelle), a decentralised agency of the European Union[16]. Inspired by educational research financed by the European Union (Agalianos, 2003), I will carry out a project there on developments in agriculture and nutrition within the EU and the interactions between these sectors and education and training. Thanks to the planned enlargement of the Union, agricultural education has suddenly been placed high on the international vocational education agenda (Løvås, 2004). In this capacity, I will have a lot of contact with the Ministries of Education and Agriculture of the member states, the EU Directorate-General of Education and Culture in Brussels, and many organisations in the agriculture and nutrition sectors in Europe. I will also contribute to the work of Cedefop related to human resource management and development, the European research report on vocational education, monitoring progress related to the Lisbon Declaration (European Council, 2000) and the Copenhagen Process (Commission of the European Communities, 2003; European Commission, 2003)[17] regarding vocational education, and the meeting of the

Council of Europe in Maastricht during the Dutch EU chairmanship[18]. You can well imagine how pleased I am to have this opportunity.

5. Acknowledgements

Ladies and gentlemen, I have come to the end of my lecture. Before closing, I would like to express a few words of gratitude.

To the Board of Governors of Wageningen University, in particular Rector Magnificus Prof. Speelman: Dear Bert and other members of the Board, thank you very much for the faith invested in me and for your willingness to alter the course of my chair. I hope and fully expect that we can further strengthen our fruitful relationship over the coming years.

To the Board of Directors of the Social Sciences Group, in particular Prof. Zachariasse: Dear Vinus, thank you for taking the initiative to place the competencies theme in the centre of the conceptual framework of the scientific domains within the Social Sciences Group during the strategic discussions about the disciplines within the Group. Thank you also for being a receptive listener to my vision regarding the domain of Education and Competence Studies.

To Prof. Huirne, until recently one of the two scientific directors of the Social Studies Group: Dear Ruud, thank you for your support of the belief that Wageningen must take its role in the education of highly-qualified teachers seriously and must invest sufficiently in these future ambassadors of Wageningen University.

To Prof. Van Woerkum: Dear Cees, thank you for the support I always received from you for the idea that education and development play a vital role in innovation and transition processes, both in agribusiness and the rural sector. You gave this support right from the beginning when I first arrived in Wageningen, and not only in your function as member of the Board of Directors.

To Dr. Blom: Dear Jan, thank you for supporting the idea that the Education and Competence Studies Group should be a part of the university and for your appreciation for the enterprising character of our chair group.

Thanks are also due to the former and present management and staff of the Mansholt Institute and the Educational Institute for Social Studies for the space we received to participate in education and research, although there is still some ground to be regained that was lost during the reorganisation. I look forward in the coming years to further shaping education and research that will fit well within Wageningen University.

To my fellow professors at Wageningen University: Due to the bizarre developments involving my chair, I have not had the opportunity to properly meet many of you. I hope, now that my somewhat rough hazing period is over, this will soon change, and that we will find opportunities for interesting collaboration on the cutting edges of our disciplines.

Colleagues in the Education and Competence Studies Group: thanks to all of you for the pleasant and appreciatory way in which we work together and in which we have been able to put our education and research on the map despite the pressures working against us. I have complete faith that we can achieve much more. We are a strong team. Together we can look

forward to making a constructive contribution in the coming years to this university and to the development of education and training in the areas of nutrition and the rural sector. I hope that we will live up to the faith entrusted in us and that our efforts will fall on fertile soil.

To the students: Almost all of students of Wageningen University will at some point in their education take part in the skills training of the chair group. A large number will also take courses in the teacher training programme. Some students will take a greater interest in education studies, and eventually choose a thesis subject within the chair group. I am very pleased that the number of such students and interns is once again on the rise. There is a large demand for experts in the field of education, training and development. As a student of Wageningen University you have the advantage of obtaining a double qualification. By familiarising yourself with educational theory and research, you have knowledge related to your own discipline as well as to educational studies. This combination makes you rare and therefore highly valued in the labour market. Interesting jobs and – if you so choose - careers are possible in education and training, both in the private and public sectors. I hope that you have enjoyed, and will continue to enjoy, the education provided by the chair group. Knowing that the quality of education provided by the chair group is, thanks to its dedicated teachers, among the best in the university, I can trust that this is so.

To my other colleagues in the Social Studies Group, the university headquarters, other expertise groups, and other working groups of Wageningen UR: Thank you for our collaboration. I hope that we will be able to build on this foundation in the coming years.

Also to the business relations outside of Wageningen UR, too many to name, both within and outside of green education: Thank you for many inspiring contacts and interesting contracts. May there be many more of the latter in the years to come.

And now to the home front: Gerriska, Danny, Robin, Féminique, Marcel and Jan Maarten, thank you for your understanding of my frequent physical and mental absences. Unfortunately I can't promise (in front of so many witnesses) that I will be able to change this situation anytime soon.

To my partner for life, Willemijn: You above all deserve thanks for everything that you have meant to me and of course still mean to me. I know you think I am married not only to you, but also to my work, and that I often stray in that direction. The temptation is indeed often great. But without your support I would not be standing here today.

To all of you, ladies and gentlemen: My sincere thanks for your interest and attention.

I have spoken.

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Notes

[1] Meijers, Van Overveld & Perrenet (2004) define seven learning objective areas (disciplinary baggage, research, design, science, reasoning and reflection, cooperation and communication, looking back and looking forward) and criteria (which they designate with qualification; the Dutch-Flemish Accreditation Organisation also adheres to this idea) for the scientific Bachelor- and Master programmes. They see competence as one dimension within which the learning objectives can be assessed (in addition to the dimensions of horizon, abstract/concrete and analytic/synthetic). The question is whether the dimension of competence pertains to knowledge, skills and/or attitudes.

[2] See http://objectif-competences.medef.fr for an overview of activities in the area of competence development in France.

[3] See for example the work of McLagan (1983; 1989) for the American Society for Training and Development.

[4] In this report competence is defined as 'a combination of skills, abilities, and knowledge needed to perform a specific task (op cit, vii). Later in the report '… in a given context' is added to this definition (op cit, 1).

[5] Murray & Skarlind (in press) pose: 'Although the proportion of jobs with low qualification requirements has indeed declined in countries such as Sweden, the UK, the Netherlands and the United States, this change has been less dramatic than what many people seem to assume (Wolf, 2001; Åberg, 2002). At the end of the 1990's, around 30 per cent of jobs in Sweden, the UK and the Netherlands and 40 per cent of jobs in the United States did not require any particular qualifications.' This gives a somewhat different image of the knowledge intensity of the whole spectrum of jobs in the labour market, and the breadth of the 'knowledge economy'.

[6] 'Ninety-nine members of the lower house of parliament were present for the vote on compulsory education, 50 of whom voted in favour of the law and 49 of whom were opposed. The only member not present was the free-anti-revolutionary J.E.N. baron Schimmelpenninck van de Oye, Lord of Hoevelaken, who would have voted against it. He had been wounded in a fall from his horse, which is why he couldn't take part in the vote. If he could have put forward his vote, the result would have been a tie, and the law would not have passed. In the upper house of parliament the law passed easily with a vote of 33 in favour and just 16 opposed.' (Meijsen, 1976, 91).

[7] The learning potential of the worksite should not be overestimated, however. Hernes (2002) points out, for example, that on-the-job learning is limiting if little innovation takes place at the worksite where it is needed, but occurs elsewhere. Furthermore, on-the-job learning is not possible when it conflicts with safety requirements or would pose too great a risk for people, health and/or the environment. It is also possible that someone may want to experiment with new behaviours, but that the worksite does not offer any opportunities to do so. Finally, the workload is sometimes (or often) too high to allow sufficient opportunity for practicing or to make it possible to distance oneself from the daily routine, which is necessary in order to reflect on current practice.

[8] Gielen, Hoeve & Nieuwenhuis (2003) argue that if agricultural education is to orient itself to supporting learning of entrepreneurs, it should be aware that learning of entrepreneurs is different from learning of adolescents. See the characteristics of entrepreneurial learning. Entrepreneurs tend to reduce risks, and tend to stay in strong and known networks. Learning that may support innovation, however, may flourish in weak, unknown networks. Competence of innovative entrepreneurship is knowing to escape the paradox of sticking to ones experience (risk avoidance) and to engage in the unknown by innovative learning. Getting useful information, and acquiring profitable knowledge in avoiding the risk of over investing time and energy in learning new concepts, strategies, methods and techniques, is important for entrepreneurs.

[9] See the brochure by Senter (2003) for an overview of the projects honoured under the Subsidy Scheme Entrepreneurship and Education 2000-2002, and for other information on the projects in secondary and higher (VMBO, MBO, HBO and WO) education.

[10] One of the most important reasons to set up this commission was the following: Three years after graduation 19% of US graduates, 10% of EU graduates, and 7 % of Dutch graduates are interested in entrepreneurship. Five years after graduation these percentages are 33, 15, and 12 respectively (Ministry of Economic Affairs, 1999, The entrepreneurial society, The Hague). Moreover, the majority of entrepreneurs found that they were not prepared during their schooling for entrepreneurship. Educational entrepreneurship is receiving increasing attention. See number 10 (December 2003) of *VBSchrift*, a publication of the Association of Schools for education based on general foundation (Vereniging Bijzondere Scholen voor onderwijs of algemene grondslag). See also F.J. de Vijlder (2003) who points to the unequal balance between deregulation policy with respect to education and the lack of new game rules for (public) entrepreneurship in schools.

[11] See Stokking (2003) for more on innovation of academic education, particularly with respect to the adoption of the Bachelor-Masters structure.

[12] See Klamer & Rutgers van der Loeff (2001) for practical examples of socially responsible entrepreneurship.

[13] There is also considerable interest in knowledge circulation from outside of the agri-food complex. Within the domain of ICT in education, for example, an interesting study was published by Van den Dool and Ten Brummelhuis (2003) that poses the same types of questions as the Knowledge Circulation in Research and Education Programme, but in this case applied to research financed by the Ministry of LNV and green education. The ICES-KIS programme and the institute of lecturers in Higher Vocational Education (HBO) are also intending to contribute more to knowledge circulation between research, education and the business sector, including small and medium-scale enterprises.

[14] More attention to Human Resource Development (HRD) is also interesting given the more general developments in this field. The International Labour Organisaton (2003) is working on a new declaration on the right of all workers to receive and have access to HRD.

[15] Bruns, Mingat & Rakotomalala (2003, 3) present a graph which demonstrates that it is unrealistic to think that the Millennium Goals with respect to primary education for all children in the world will be achieved. Moreover, the trend in the Middle-East and North-Africa is leaning slightly in the opposite direction.

[16] Those interested can read about Cedefop and the European Training Foundation in the December 2003 Newsletter of the Max Goote Knowledge Center for Vocational and Adult Education (Kenniscentrum voor Beroepsonderwijs en Volwasseneneducatie - MGK bve). See also: www.cedefop.eu.int; www.trainingvillage.gr; www.etf.eu.int.

[17] The objectives of the so-called Lisbon Declaration and the Copenhagen Process are summarised in the December 2003 Newsletter of the MGK bve. The Lisbon Declaration deals with Europe as a knowledge economy, the importance of human resources and the investment in education and training. The Copenhagen Process focuses more on the implications of EU enlargement.

[18] The European Commission has established a number of different 'priority areas' for vocational education in Europe: 1. Developing a single framework for the transparency of qualification and competences; 2. Quality assurance; 3. Developing a European credit transfer system for VET; 4. The European dimension; 5. Validation of non-formal and informal learning; 6. Lifelong guidance: strengthening policies, systems and practices; 7. Increasing support to the development of sectoral qualification and competences.