Design, Implementation and Effectiveness of Capability-Oriented Workplace Learning in East-Africa

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1. Introduction

Workplace learning is to a large extent studied from a Western/Northern perspective (see the contributions in Malloch, Cairns, Evans and O'Connor, 2010), which is understandable given the focus of the researchers in the field of workplace learning.
The objective of this paper is to study the introduction of workplace learning in the context of higher education in two East-African countries, Uganda and Ethiopia and to evaluate the effectiveness of principles for capability-oriented workplace learning in the case of Uganda by looking into stakeholders' perceptions and labour market effects. Curricula with three educational institutions were developed. A strong emphasis was put on learning in authentic working situations. Various internships were planned throughout the programs.

The research questions in this study are:

1. *How do the various stakeholders perceive the implementation of capability-oriented workplace learning, and*
2. *To what extent influences this learning approach labour market entry and career perspectives of graduates?*

From a wider perspective, this study is part of a sector development project in the countries mentioned above. The stakeholders in this project have an interest in the development of the sector to increase employment, income generation, the gross domestic product, and inflow of foreign currency.

The study is also part of a series of projects in the field of education development cooperation worldwide in which notion of capability-oriented and outcome-based education. Apart from labour market effects, special attention is given to health, gender and empowerment issues in these projects.

The sector concerned is floriculture in Uganda and horticulture (including floriculture) in Ethiopia. Large quantities of produce from these sectors are being exported to Europe in closed (cool) supply chains. Most of this is being traded via flower and food auctions in Western-Europe. The auctions in the Netherlands have a world-wide reputation in the flowers and plants business. They process 12 billion flowers and plants annually, with a total turnover of over 3,8 billion Euros; on a daily basis 20,000 different varieties are being traded.[1]

2. Theoretical framework

As stated, much of the workplace learning literature (Malloch et al, 2010), has a Western or Northern flavor.
However, there is a growing of body of educational research in Eastern-Africa (Teferra, Dalelo and Kassaye, 2009).
But, attention for workplace learning in research is still limited, as the emphasis in education at least in Uganda and Ethiopia is on general education. All children should attend primary education and as many pupils should subsequently attend secondary education[2]. However, attention for Technical-Vocational Education and Training (TVET), the apprenticeship system and workplace learning is increasing. Various international development programs include workplace training and development. Different approaches are being employed, but when it comes to workplace learning, the capability and outcome-based learning approaches have been prevailing during the last decade (Arguelles and Gonczi, 2000; Van Halsema, 2008).

It is remarkable that literature on extension is hardly used in the field of workplace learning, whereas it is a dominant field of practice in many developing countries. Grown from the field of adult learning, agricultural extension is well-known for its systems, professionals, strategies and practices. The field has its own societies, conferences and journals. An overview of the field is given by Van den Ban and Hawkins (1996), but also other authors actively contributed to the nature and position of agricultural extension (e.g. Swanson, 2006; Birner, 2009; Rivera, 2009). Being mainly focused on the development of sustainable workplace learning of farmers, much attention has been given to the multiple-stakeholder approach of social learning recently (Wals, 2007).

There is a strong feeling in the field of extension that sector development should be focused on informal and practical learning which leads to short and medium term income generation and poverty alleviation. Practical and social workplace learning of all stakeholders play an important role in development projects described in this paper.

[1] www.floraholland.nl (09-03-2011)
[2] see the Education for All program of UNESCO: http://www.unesco.org/en/efa/ (retrieved July 19, 2010)

As mentioned above, education and learning in Uganda and Ethiopia is mainly of general nature. There is only limited attention for work-related education and learning. This holds for the primary and secondary level of education, but also for higher education. The emphasis on general education is related to the labour market structure. Many graduates pursue a position in governmental organizations in which they have a certain level of income security and employment protection; this is different in the private sector in which the labour market is considerably smaller and riskier. The largest part of the private economy is also informal, household or small-holder driven.

The effect of this is that graduates from higher education are knowledgeable about certain content matter areas, but that they are not really equipped with know-how to apply knowledge in practice. This limits their socio-economic potential.

The very essence of competence-movement in education is to equip students with knowledge, skills and professional attitudes which they can and learn to apply in authentic workplace contexts. Various researchers (Mulder, Lans, Verstegen, Biemans & Meijer, 2007; Mulder, Weigel and Collins 2007; Biemans, et al, 2004; Biemans, et al, 2009; Brinkman, et al 2007; Du Chatenier, 2007; Eraut, 2009; Hughes and Cairns, 2009; Karbasioun, et al, 2007; Lans, 2009; Lans, et al, 2009) have pointed at the essence, strengths, challenges and pitfalls of the concept of competence-based education and learning. The international critiques on the concepts and practices of competence-based education have resulted in using adjectives like 'holistic', 'new', 'integrative' or 'comprehensive' competence. These attempts have in common that the notion of competence-based education means that students are supported to acquire broad capabilities to perform in jobs and function in society according to set standards and expectations. This includes personal development, preparation for participation in life-long learning, and citizenship. Since the term competence-based education is so broad and differently defined, following Malloch and Cairns (2010), we are using the term capability-oriented education in this paper. In international education development cooperation the term capacity development is also very popular. All these terms (competence, capability and capacity development) have in common that they want to express that knowledge acquisition should be expanded by skills and attitude development, that competence refers to an integrative capability to perform tasks in jobs or professions, according to a set of standards and expectations. In workplace education and learning competence refers to the minimum level of mastery needed in a certain sector of society or the economy. This implies that there is a large room for expanding professional expertise in the direction of excellence and even brilliance. In education capability-oriented education most frequently is used for referring to individual expertise. However, there are also higher levels of aggregation on which the concept of capability can be used, such as teams, work units, departments, organizations, regions, cities, and even nations.

Wesselink (2010) and her co-workers have developed a matrix of comprehensive competence-based vocational education, in which the notion of workplace learning plays a key role. The matrix consists of eight principles and four implementation levels. The combined set of principles should contribute to the development of quality vocational or professional education.

Sturing (2008) recently expanded the matrix in het PhD-project and made it more specific for the current context of competence-based vocational education.

The notions of professional development, multi-stakeholder social learning, and the principles of competence-based education have been employed during the study which is reported in this paper.

3. Methods and technique

Curricula of three educational institutions were developed and implemented based on labour market research and task analysis. These institutions are the Mountains of the Moon University (MMU) in Fort Portal and Bukalasa Agricultural College (BAC) in Wobulenzi, both in Uganda, and the Jimma University College of Agriculture and Veterinary Medicine (JUCAVM) in Ethiopia. MMU is a young private university, whereas BAC is a public school for secondary agricultural-vocational education. With MMU and BAC new (2-year) Diploma and (1-year) Certificate level education programs were developed in the field of Floriculture. This development project started in 2006, and finished in the summer of 2010. With JUCAVM a new Master of Science program on Horticulture was developed, and an existing Bachelor of Science Horticulture was re-designed. This project started in 2007 and will last until 2011. The curriculum development methodology in these three cases was similar.
A small number of staff of the institutions has been trained in the principles of competence-based education and learning in the Netherlands. The course they took lasted several weeks, and existed for the larger part of content-oriented information and extension.
Experts in the field of competence-based workplace education and learning travelled frequently to the three locations to give workshops and to cooperate with the local staff. The missions were preceded by the joint development of Terms of Agreement, so that – ideally – both parties were well-prepared for the events to happen.
The first students of the Diploma course in Uganda started in September 2007. The start of the Certificate course started later because the institutions doubted whether they should start this course parallel to the Diploma course. After a long period of deliberations the first group of Certificate students started in spring 2010 (in BAC). The first MSc students in JUCAVM started in 2008. The redesigned BSc course started in 2009.

As mentioned, theoretically founded principles for competence-based curriculum (re-) design were employed. The programs were evaluated using qualitative interviews with students, interns, graduates, internship supervisors, employers and teachers. Topic lists and pre-structured questionnaires were used for the interviews.

4. Data sources and materials

Data were collected about the labour market needs, tasks of workers, labour market entry of graduates, the perceptions of the various stakeholders with the training programs, the workplace learning component and its effects, and the sustainability of the workplace learning approach. Data was analyzed using descriptive quantitative and qualitative analysis techniques.

Labour market analysis (in Ethiopia) was conducted using a weighted stratified sampling matrix based on the flow of graduates to the labour market. Proportionate numbers of interviews were held with representatives of the employment categories, such as primary producers, processing companies, extension agencies, governmental agencies, educational institutions, research institutes, and non-governmental organizations. Labour market needs in Uganda were analyzed by desk research.

Tasks of workers in the sector were analyzed by site visits and in-depth interviews. In certain cases job descriptions were shared, but these cases were rare. The task list was categorized by type of jobs, and results of every interview were assimilated in a task overview (job profile). The tasks lists were completed with an overview of key competencies which were regarded as essential by the interviewees. The final product was shared with the response-group, but only a limited number of reactions were received (-mobile- telephone communication is difficult, post is slow or ineffective, email is often not available).

Interns were asked fourteen questions about the following topics: how many internships they took; for how many weeks/months; the location of their internship(s); the level of satisfaction with the internship; the quality of the communication between teachers and internship supervisors; the information of internship supervisor about what competencies the interns needed to develop; the match between the expectations of teachers and of internship supervisors; the opportunity to do the tasks their teachers expected them to do; the activity(ies)/responsibility(ies) of which they learned most; the extent to which they explicitly worked on developing their competencies; the competencies they needed to be successful during their internship; the support of the teacher; The internship supervisor gave support during my internship; the level of interest of the supervisor in the curriculum; the way the assessment took place.

The graduates were asked a series of questions, part of which were also asked to students. The questions were about the following topics. There were questions on background information, including a question about what had triggered the graduate to subscribe to the program as a student; what the pre-assumptions were regarding the program; their awareness of the fact that the program would be a competence-based. Next they were asked a series of questions, regarding: whether they passed the program; how long this took; what the marks were of the students; reasons for not passing the program; satisfaction with the program; the experiences balance between theory and practice; their description of the practical activities in the program; the extent to which the program gave a good idea of what the job and tasks of a supervisor/manager at a flower farm entails; their view on the effect of the competence-based program on themselves; competencies did developed during your competence-based curriculum; aspects of the program that had most impact; elements in the curriculum they disliked; opportunities they got to change the diploma course program; hurdles experienced during the diploma course program; their opinion to keep the program competence-based; the program fee; the maximum feel level they would be willing to pay. The following topics were included in questions about their current job: the activities they did after they finished the study program; how easy or difficult it was to find a job; how long it took to find a job; the name of the company were they were employed; the title of their job; the kind of activities/responsibilities they get in their job; the transition from your education to work; the extent to which they can develop in their current job; the opportunity to learn new things; their ambitions?

Internship supervisors were partly asked the same questions as the employers. Other questions for them were about the following topics: their supervision of students; their satisfaction with the students and graduates; activities given to the intern; the amount of observing, co-working or independent work by the intern; the amount of supervisory/managerial tasks performed by the intern; kinds of responsibilities given to the intern; the extent to which the interns could deal with their responsibility; their perceived differences between interns from this competence-based programs and those from other programs; the extent to which this had an influence on the tasks/responsibilities they received; the way in which support was given to

the interns (discussing competencies, formulating learning goals, answering questions, reflection and evaluation meetings); the extent to which they experienced difficulties with supporting the interns; the way in which they assessed the interns; the extent to which the internship supervisor is interested in having new interns from the programs.

Employers (general managers or owners) were asked fourteen questions. First they were asked whether it was correct that some of their employees graduated from the floriculture diploma course of the partner institutes. They were also asked whether they were aware of the fact that this program was a competence-based educational program, and how they would define a competence-based education program, and what characteristics they saw as being important in a competence-based curriculum. Next various questions were asked about the graduates: how long they were working at their organization; whether the graduates were properly prepared to work at their flower farm and whether they could smoothly start working; whether they are working as a supervisor or manager; whether they were competent to work as a supervisor or manager at the flower farm; competencies they have, and competencies they are they lacking; the professional attitude of the graduates; the general satisfaction with the graduates; whether they saw a difference between these graduates and other employees; whether the graduates were missing any knowledge of skills; whether they were interested in hiring one or more of those graduates; whether they were involved in the development of the competence-based curriculum at the educational institution; their satisfaction with their relationship with the educational institution.

The interviews with the teachers consisted of twenty-one questions. Apart from a number of background variables regarding the teachers, questions were asked about the following topics: the extent to which they felt they understood the various aspects of a competence-based curriculum; their definition of competence-based education; their opinion about the most important characteristics of a competence-based curriculum; their satisfaction with the program; the aspects of the curriculum they appreciated and depreciated; the balance (ratio) between theory and practice in the program; their description of the practical activities in the program; their opinion about the extent to which the program offered students a good picture of what the job and tasks of a supervisor/manager at a flower farm entails; their perception regarding their ability to design educational or training programmes connected to the demands and tendencies in the labour market and society; whether the competence-based education program as learned during the project was relevant for their own context; their perception regarding their ability to implement CBL successfully; their feeling about the question whether the curriculum had a positive effect on students; the effects of the program they saw on students; observed differences between students who did and did not follow the competence-based program; the competencies students develop during the program; hurdles experienced during the implementation of the program; the way the program changed their teaching; the way in which the relationship/communication/collaboration the flower farms changed due to the program; their satisfaction with their relationship with the flower farms; the use the evaluation and quality assurance system; and the opportunities for changing the CBL program.

The labour market entry of the first fifteen graduates of the first Diploma group (from BAC) was studied in-depth by visiting all employers of the thirteen graduates who were working in flower farms after graduation. These graduates could be traced via the Uganda Flower Exporters Association (UFEA) in Kampala, the employer association which coordinated the project in Uganda. The UFEA places the interns in workplace learning places for both MMU and BAC.

Other stakeholders were: the employers, the management of the educational institutes and the teachers. They were all interviewed during different missions. Reports were written and agreed after each mission.

5. Results and conclusions

In this section the results and conclusions of the research will be presented. First the results of the labour market research are described. Next the research results on the occupational profiles of the workers will be presented. In the next section the stakeholder perceptions of the study program will be elaborated. After that the impact of the educational program on employment will be described. Finally the conclusions of the study will be presented.

5.1 Labour market research

Labour market needs were studies in Uganda and Ethiopia. In Uganda the quantitative data were derived from sector studies which indicated that the floriculture sector was expanding and that more trained workers were needed. In the case of Ethiopia primary data were collected.
As stated interviews were held with employers of the graduates. Data collection appeared to be very difficult. It was advised by the educational institutions not to include farms in the sample that were visited recently in the framework of the national Business Process Review (BPR) in order to prevent 'respondent fatigue'. Therefore we focused on organizations that were not yet (enough) covered in earlier research: vegetable and fruit farms, processing companies and development organizations.
National data on employment in the horticultural sector is unfortunately not (yet) available. The Horticulture Development Agency is currently conducting a quantitative research, covering the flower, fruit and vegetable farms.
To collect data from farmers site visits were needed. Organized appointments upfront were practically impossible because of the frequent inaccessibility or absence of internet for email communication and interrupted availability of the mobile communication networks. Because farms are in rural areas, long drives were necessary to visit the farms. This consumed a lot of time and quite often resulted in only making an appointment for an interview which would then take place during the second visit. In some cases the second visit was not effective because of the fact that the key informant was not present. Regarding corporate visits in the food processing sector and visits to public employers the interesting situation was that respondents had difficulties in predicting the development of labour needed because this is in most cased decided in the head offices in Addis Ababa. Decentralized units do not have information about the employments plants in the organizations.
It must be noted that the sample of the interviews was limited and that preference was given to certain disciplines and geographic regions; this may have influenced the results of the research. Furthermore, the experiences of the labour market with respect to the graduates they currently employ, are not easily comparable with the new graduates. Therefore, the gaps that were identified in the competencies of the graduates do not necessary reflect the gaps in the current curriculum. Furthermore, most of the quantitative data for the longer term is based on estimations since hard data is often not available. Last, it is often hard to compare the data of different organizations since they use different criteria. For those reasons it is difficult to draw valid conclusions out of the quantitative data on employment needs.

Labour market analysis Ethiopia
Eventually, twenty-three interviews were conducted on farms, processing companies, departments of Ministries, research institutes and development organizations. The interviewees were asked to answer questions about the relevant occupations and jobs for BSc graduates at their organization, the current needs concerning employees, their plans for expansion both in size as in new disciplines and replacement expectations. Also, they could give comments on the current curriculum based on a list of the courses Furthermore, they were asked to prioritize the tasks of a draft occupational profile. Some organizations could supply written job descriptions that helped to design the occupational profile. In the interviews, companies were asked for their cooperation in the supply of internship places and if possible per diem and/or accommodation.
Next to this eight organizations were consulted by email with similar questions. A graduate survey will be carried out by the educational institution, which can serve as a continuous method of quality assurance. Results of the analysis were discussed during a meeting with representatives of the labour market.

Sector development
Within the horticultural sector there are several trends that affect the labour force for certain horticultural products.
In Ethiopia most farms used to be owned by the state. Nowadays more and more land is sold or hired to private entrepreneurs, mostly foreign investors. Where most of the food for own consumption or the local market is still produced by smallholders, the commercial farms focus mainly on export.
The flower industry, especially roses, has been a booming business in Ethiopia. Around Addis Ababa and Debre Zeyit large greenhouses were emerging, often with very advanced computer systems. There are also farms that go beyond one specific sector.
The flower farms create jobs for many especially unskilled workers. Most of the interviewed farm managers were each employing between 200 and 400 persons in total of which only 1 to 5 were BSc-graduates. One farm even employed around 1100 people. In 2008, the sales of flowers began to decrease due to the economic crisis. Therefore, flower farm managers were looking for expansion areas within the flower industry next to production, such as breeding and research. This shift would imply labour force needs at a higher skills level. One rose farm cooperates with Wageningen UR, and another one provides the opportunity for other entrepreneurs from all over the world to perform farm trials.
As for flowers, certification such as GlobalGAP (this is an international code for Good Agricultural Practices in farm management which is being applied by various farms) and Fair Trade (one of the food processing companies in this study was applying for this) is becoming of increased importance for the export market. Some farms will specialize more in processing and marketing rather than only production. There was only one flower farm that applied integrated pest control. Quality control received increased attention due to stricter regulations or certification criteria of the importing countries.
BSc-graduates can be employed at the flower farms as supervisors or managers for a certain division (for example production, spraying, packaging, trials). For the flower industry it can be concluded that the labour force for BSc graduates will remain stable but the subjects that are most important might change.
Vegetable and fruit production for export is relatively new in Ethiopia but has good perspectives for export to Europe and the Middle East. Recently, large farms have been established and they are still expanding. For vegetables, the focus is mostly on pulses (peas, green beans, sugar snaps), pepper, baby maize and cabbage for export, and tomatoes and

onions for the local market. Where fruit production in the past focused mainly on tropical fruits for the local and international market (including mangoes, papaya, bananas, and pineapples) on a small scale, the attention shifts to temperate fruits such as table and wine grapes, apples, avocadoes and strawberry for export. Also passion fruit and citrus are now produced as tropical fruits for the export market.
It is expected that the labour force as a whole in this sector will increase due to growing and newly established farms. The amount of BSc-graduates among them however is generally small. One of the organizations in Debre Zeyit has over 800 employees of which fifteen are BSc-graduates. The other farms employ only between one and five BSc-graduates in horticulture or with a similar background.
Spices are a relatively small business and the labour force will most likely have a slight growth but mainly at production level for unskilled workers. Spice-growing is mostly done by smallholders especially in the south of Ethiopia or combined with fruits and vegetables on a commercial farm.
Coffee production is very important for Ethiopia (as the country in which making coffee was invented) because of its big size, especially in the Western part of Ethiopia. For example Limu has seven farms, 4,000 employees and 10,000-20,000 seasonal workers. Out of them an estimated thirty to forty are BSc-graduates with a degree in horticulture or a similar field. In Addis, 200-250 staff members work for a coffee production development enterprise. For new BSc-employees this company uses two hiring approaches: the first is to provide training for Diploma-holders to become BSc-graduate; the policy is to upgrade ten persons a year in this way. The other option is to recruit new BSc-holders from the market. The replacement of BSc staff is generally low so it is expected that most of the new staff is recruited with diploma level. It is expected that the sector will remain stable.
Tea production is relatively big in Ethiopia but the plantations are in remote areas. Therefore, not much focus attention has been given to tea and no tea plantations or processing companies have been visited. It is expected that this sector will remain stable.

A fact which complicates extrapolation of present labour market and sector data is that there is no linear relationship between the growth of the sector and the demand for BSc-graduates. Some farm managers were mentioning that they would rather hire BSc-graduates or diploma holders from other disciplines than horticulture or workers who do not have a degree but passed grade twelve. In was stated that those workers receive in-house training and are generally more committed to stay for a longer period of time than BSc-graduates in horticulture who are offered several jobs and tend to leave soon to another company that is paying higher salaries. Other farm managers mentioned that working experience and performance level is more important than having the degree. For farm managers on-farm performance and relevant working experience has more weight than educational level. The fact whether a farm is expanding or not thus does not necessarily reflect the need for new employees. Expansion in production often means an increase in the demand of unskilled workers or people at the diploma-level. For BSc-students there are more opportunities if a farm expands in new disciplines, such as breeding, IPM or research.

Processing and quality control
Vegetables and fruits were mainly exported fresh. However, value can be added through processing. Grapes were already processed for some time into wine. Small factories for processing fruit and tomatoes also existed already. One farm which is in hands of Dutch and German entrepreneurs plans to expand processing by producing tomato paste and fruit juice. It is expected that more persons will be hired for this, but on the large scale this will be candidates with a background in food science or engineering rather than horticulture.

Another important discipline is the grading and quality control of coffee and tea. The quality control unit of the coffee quality control in Addis Ababa established seven new laboratories where forty-three bachelors can be employed for research.

Government
Graduates with a background in horticulture will most likely be employed at the Ministry of Agriculture, which also includes rural capacity building. Governmental agencies generally employ people with at least two to three years of working experience and with a BSc-education as minimum requirement. At the department of entomology, however, recently ten people out of sixty are employed as new graduates, just like at the extension department where five out of around thirty are employed just after graduation. Although the need for extension workers and people working at the Ministry of Agriculture seems to be high, it is mentioned by those organizations that they find it very important that graduates have practical experience through working on a farm before they start as a trainer or policy maker.

Extension
New employment needs of the extension service is specified by the budget that is determined by the sub-district. In the Jimma zone, currently 1,000 people are employed as extension professional, of which around ¾ have a BSc-degree or above; the rest are diploma-holders. The organization has the policy to employ as much in-service persons as possible and upgrade their education if necessary. In order to train farmers on new technologies, a strong relation with research institutes is necessary.
One extension worker mentioned that the crops in the curriculum often focus on the crops interesting for commercial farms. He pointed at the importance to do research for the indigenous crops such as enset (false banana), occra and anchote. They have most potential for smallholders because of their resistance to drought and pests. is very crucial to meet the demands of the poor because of its socio-economic importance.

Development organizations
Staff of development organizations are often divided in staff at the head-quarters, who are mostly policy makers, and in the field, who are mostly extension workers. One organization that provides technical assistance throughout the value chain to private sector exporters now employs thirty-five staff of which five are BSc-holders with a background in horticulture or a similar discipline. Another organizations employs twenty people of which ten are BSc-graduates. Due to the expansion of projects seven new employees were to be hired extra. Still another organizations had 6 persons are at the headquarters on issues related to horticulture, but in every district they hire facilitators. In UN organizations like FAO and the Economic Commission for Africa (UNEFA) new graduates can become research-assistants or project-supporters, but they said they generally hire only one or two BSc-graduates from horticulture or related fields per year. The FAO, however, appeared to be interested in having a fellowship with the educational institutions. The development organizations are attractive for graduates because of the high salaries and training opportunities.

Teachers
Teachers with a background in horticulture can be employed at TVET- (technical-vocational education and training) and ATVET- (agricultural technical-vocational education and training) colleges and universities. The ministries of Education and Agriculture determine employment needs in both TVET and ATVET.

Research institutes

The general policy in Ethiopia for public institutes is to upgrade the educational level of employees. This implies a 'scaling up' of the educational qualifications for a specific job function. The tasks that Bachelor-graduates are currently carrying out will be taking over by MSc-students. In the same time, tasks that are carried out by diploma-holders may change to become tasks for Bachelor-graduates. The agricultural research institutes decided to hire MSc-graduates only.

Internships
Organizations that were interviewed were asked about the possibility to host students for a field attachment (=internship). Most organizations were enthusiastic about this and were willing to host, supervise and in some cases accommodate about two to four students. However, because of the limitation of the government to pay a per diem, hosts are requested to pay per diem and/or provide accommodation. The education institution wanted to make long-term agreements with companies who are willing to host students to pay the students full per diem or provide accommodation and pay part of the per diem. The producers and export association could take a leading role in the facilitation of internship placements and give training to potential supervisors of the interns. The association (EPHEA) covers flower, fruit and vegetable farms.

5.2 Occupational profiles of workers

Regarding the tasks of workers, an occupational profile analysis was carried out which was aimed at identifying and structuring task and competence areas which could serve as the basis for the curricula of the programs in the projects.

Based on the site visits and in-depth interviews in the projects in Uganda as well as in Ethiopia overviews of different jobs, important areas of responsibility and tasks and activities could be identified and structured in fields. Various job descriptions were shared, but essentially work-processes were studied in workplaces and activities which were performed by workers were analyzed. An important step in the process was the stratification of jobs. In the case of Uganda it appeared that six different jobs could be identified (see Annex 1). These six jobs were divided over two levels, a managerial level and a supervisory level. On a managerial level there were two different kinds of jobs: the farm manager, and the production manager. On a supervisory level there were four different jobs: the greenhouse supervisor, the fertigation supervisor, the spraying supervisor, and the post-harvest supervisor. In the case of Ethiopia in total eight different occupations could be identified (see Annex 2). These were researchers, trainers/teachers, consultants, extension officers, private investors/entrepreneurs, managers, development workers, and policy makers. These eight different occupations have been put together in three groups because of the fact that many of the tasks and competencies of the occupations were overlapping. Group 1 were researchers, working in a variety of research institutes. Group 2 consisted of occupations that were mainly aimed at collaborative learning and co-constructing knowledge and/or innovative policies and practices. These were trainers/teachers, extension agents, development workers, policy makers, and consultants. Group 3 represented the occupations that strongly relate to managing a business. Identified occupations in this group are managers and private investors/entrepreneurs.

Using the occupational and competence profiles enabled a strong workplace orientation of the education programs. During the curriculum development and subsequent course development and even teaching guide development process deliberate attempts were made to increase the

practical nature of the program as much as possible. This was done by adhering to the principles behind the matrix of competence-based vocational education as developed by Wesselink, 2010).

5.3 Stakeholder perceptions of the study program

From the various educational institutions, at the moment of data collection the Diploma-course students of one agricultural college in Uganda were the only group that graduated so far. [i] Therefore the stakeholder perceptions regarding the study program and the employment impact study were limited to the case of the agricultural college in Uganda.

Interns and graduates

During the field work companies of the graduates and interns were visited. In total twenty-one interns and graduates were interviewed. Of these 11 graduates (start September 2007) and 4 interns (start September 2008) came from the agricultural college, and 6 interns (2 start September 2008; 4 start September 2009) were from the university (the university program had not yet finished during the period of data collection).

Table 1 presents the general perception of the interns and graduates who were included in this part of the research. All topics for evaluation were asked using a 5-point Likert-scale, of which 1 was the maximum positive score.

Table 1 Averages of graduate evaluations by course evaluation topic (total n=21)

Evaluation topic	Average
Satisfaction program	2.19
Tasks of supervisor	1.67
Tasks of manager	2.14
Satisfaction with the internship	2.05
Communication teacher-internship supervisor	2.48
Supervisor aware of which competencies needed to be developed	2.43
Expectation teacher and supervisor matched (1-5)	2.19
During internship I was able to develop my competencies	2.00
Teacher gave support during internship	2.10
Supervisor at farm gave support	2.24
Internship supervisor involved and interested in CB program	2.29
Ranking of current job (n=15)	2.00
Total average	2.15

The total average score on all evaluation topics is 2.15. That equals a total satisfaction score of 77/100, which is a good average.

Teaching staff

In total fourteen teachers were interviewed, seven from the agricultural college and seven from the university.

Their understanding of the concept of competence-based education differed significantly. The university staff members who were included stated on average that their understanding was 1.86 (=83/100; good) whereas the college staff members included stated on average that their understanding was 3.14 (=57/100; sufficient). This may be the effect of the involvement of teachers in special Teaching of Trainers which took place in the Netherlands and of participation in workshops and the design of the competence-based program. One of the college staff members included here was participating in the design of the program and the related activities, whereas three of the staff members of the university participated. These three teachers scored their understanding of the principles of competence-based education as maximal.

The satisfaction with the program of all teachers included was 2.07 (=79/100). This score is equal to good. The relevance of the competence-based curriculum was rated high. All teachers rated this as 1.00 (100/100) (data for two teachers are missing). The teachers at the university reported on average quite successful implementation of the program 2.33 (73/100; data from one teacher missing). The teachers of the college did not really answer this question. The teachers from the university stated the program had very positive effects on the students (average 1.00; 100/100). The teachers from the college stated that they do not see a big difference between the competence-based program as it is implemented currently and the other programs they are teaching. Two of the college teachers reported good effects on the students, and one teacher reported that during the project he learned to be a teacher at the course.

The relationships of the university teachers included in the study with the flower farms is poorly developed (average 4.33; 33/100). Most teachers never visit a flower farm, which is related to the fact that most flower farms are around Entebbe, as explained above. Teachers from the college are more positive about their relationship with flower farms (average 3.34; 67/100).

It was striking to see that the college did not have a student evaluation and quality management system in place. The university had a student evaluation system by which courses were evaluated. The respondents however reported that the data were not used by several teachers.

Employers

As indicated above, as many farms as possible were visited to hold interviews with managers and supervisors. In total fifteen farms were visited and interviews were held with twenty-two representatives. These representatives held a range of jobs: (general, location or farm) manager, production manager, cultivation manager, field manager, supervisor, supervisor propagation, and HRM staff worker (see Table 2). One of the respondents was also a project member; she participated in the Training of Trainers in the Netherlands and contributed to the curriculum development. As can be seen in Table 2 the number of graduates employed and the number of interns varied by farm.

Table 2 Evaluations of different farm representatives regarding the competentiveness of the program (CB), competence (Comp) and Professional Attitude (ProAtt) of Graduates (Grad) and Interns (Int) and relationships with the college (COLL) and university (UNIV) by farm

Flower farm	Job title of farm representative	Number of graduates employed	Interns/Graduates	CB	Graduate		Intern		Relationship of farm with	
					Comp	ProAtt	Comp	ProAtt	COLL	UNIV
1	Prod mngr	0	Intern	5			2	3	3	3
	Loc mngr		Intern	5			2	2	4	4
	Loc mngr		Intern	5			2	2	4	4
	Loc mngr		Intern	5			2	2	3	3
2	Superv	Farm went bankrupt		3			2	2	4	4
3	HRM staff	5	Grad (COL 1st batch)	2			1	2	2	4
			Grad (COL 1st batch)							
			Grad (COL 1st batch)							
			Grad (COL 1st batch)							
			Grad (COL 1st batch)							
4	Prod mngr	0	Nn	5	2	2	3	2	2	4
	HRM staff			5	2	3	2	2	3	3
5	HRM staff	4	Grad (COL 1st batch)	5	3	1	3	2	4	4
			Grad (COL 1st batch)							
			Grad (UNI 1st batch)							
			Grad (UNI 1st batch)							
6	Cultiv mngr	1	Grad (COL 1st batch)	2	4	2	4	2	4	4
7	HRM staff	0	Int	5					5	5
	Manager		Int	2	2	2	2	2	4	3
	Manager		Int	4	1	1	2	2	5	5
8		1	Grad (COL 1st batch)	4	1	1				
9	Superv prop	2	Grad (COL 1st batch)							
	Prod mngr		Grad (COL 2nd batch)							
10	Superv	0	Int	5			2	2	5	5
11	HRM staff	1	Grad (COL 2nd batch)	4	2	1	3	2,5	2	4
	Prod mngr			4			2.5	2	2	2
12	Field mngr	0	Int	4			2		2	4
13	ToT-participant	1	Grad (COL 1st batch)	2	1	1	1	1	2	2
14	Farm mngr	1	Grad (COL 2nd batch)	3	1	1	2	3	4	4
15	Farm mngr	1	Grad (COL 1st batch)	5	2	2			5	5
Total averages (corrected for partial non-response)				**4**	**1.91**	**1.55**	**2.19**	**2.35**	**3.45**	**3.8**

The farm representatives were not very well informed about the competence-based nature of the floriculture curriculum (average 4.00; score: 20/100). However, respondents were quite satisfied with the competence level of the graduates (average 1.91; score: 82/100) and their professional attitude (average 1.55; score 89/100). The satisfaction with the interns was lower, but still satisfying: their competence level was rated on average 2.19 (score: 76/100) and their professional attitude on average 2.35 (score: 73/100).

The relationship of the farm with the educational institutes was low. During the data collection some respondents made a distinction between the college and the university. On average scores for the college (average 3.45; score 51/100) were slightly more positive than for the university (average 3.8; score: 44/100). This again may be caused by the fact that the flower farms are at a large distance from the university.

Competentiveness of the program

The perceptions reported above can be corroborated by the analysis of the so-called 'competentiveness' of the program. By this we mean the degree to which a study program complies with a given set of principles of competence-based (or capability-oriented) education. These principles have been reported in various publications (which is summarized in the dissertation of Wesselink, 2010) and recently expanded in a paper by Sturing, Biemans, Mulder & De Bruijne (2011). In the case of Uganda seven principles were used to analyze the implementation of the course program. The principles were used as criteria to evaluate the level of implementation of the competence-based education approach. The same analysis method is (Sturing, op cit) and was (Nederstigt & Mulder, 2011) used in studies on the implementation of competence-based vocational education in the Netherlands and higher education in Indonesia.

The results of this analysis is presented in Table 3.

Table 3 Analysis of the 'competentiveness' of the education programs in the case of Uganda

	Principles CB	Description	Challenges
1.	**The competencies, that are the basis for the curriculum are defined**	*A job capability profile was put together by partners of Wageningen UR, teachers of the Ugandan college and university and employers of flower farms.* *Flower farms express the need of educated peoples; most people they work with are not able to speak English, which is causing a lot of miscommunication.*	Developing the diploma course opened doors to do commercial flower farms industry The current connection with Flower farms and HEI can still be defined as not strong. There is no feedback structure established, which makes it questionable if the curriculum will be improved according the needs of the labor market. Many employees in the flower farms are not aware of the diploma course. Prior learning of the diploma graduates is not recognized; the graduates are trained on the farm for a period of 4 to 14 months and they get a salary between 80.000 Ush and 260.000 Ush. Graduates swap from one farm to another, since they experience harsh working conditions. Reason expressed by students for choosing the course, was the high possibility of finding a job.
2.	**Vocational core problems are the organizing unit for (re)designing the curriculum (learning and assessment)**	*Core problems were used as the organizing unit for (re)designing the curriculum*	Most of the teachers are not knowledgeable about the flower industry. Some never went to a flower farm themselves. They got training through the project. Some students said that the teachers were also students. And the teachers said that they learned a lot from the students when they came back from their internships. The core problems are used for designing the curriculum but if they are used for teaching is questionable.
3.	**Capability-development of students is assessed before, during and after the learning process**	*The students are assessed during and after the learning process; Case studies, presentation, reports, oral exams and written exams.*	The floriculture diploma course is the only course using this type of assessments in both HEIs. Teachers are experiencing difficulties to give marks for the formative assessments. You can't fail the formative assessments, if failed, you can retry directly. Teachers do not always check students during their internships. The farm managers and supervisors are not always aware what students should be doing at their farm.
4.	**Learning activities take place in different authentic situations**	*Learning takes place at Greenhouse, classroom and at different flower farms There are 3 internships in the curriculum; The 1st internship is 2 weeks and is an orientation for students. The 2nd internship is 1 month, and students should specialize in 2 departments. The 3rd internship is 2 months and is a kind of research that should carried out at a flower*	Learning at the flower farms is not always checked by teachers. Supervisors at the farm learned by experience and are not always capable to answer the technical questions of the students. During the 1st and 2nd internship students go to all departments The 3rd internship (research) is done at the college due to not being able to pay for the costs. Previous the project was being for the cost made during the internship.

	farm	
5. In learning and assessment processes, knowledge, skills and attitudes are integrated	*All graduates were satisfied with the curriculum. They learned what they needed to learn to be able to work in the flower farms. They enjoyed the practical's and the interaction with the teachers.*	High turn-over of staff. Most of the teachers of ToT left. The current teachers are less capable of doing integrated learning.
6. Self-responsibility and (self)-reflection of students are stimulated	*At the College students are working independently in the greenhouses. Interaction is stimulated by the teachers at the University and the College*	There is no strategy to pass on the gained capabilities of CBE/L to future teachers. Flower farms are used to work with low educated people, very capable of doing the work but not always knowing why they do what they are doing. As said by one of the employees; *"Sometimes it is more easy not to be challenges by your workers"*.
7. Teachers both in school and practice fulfill their roles as coach and expert equally	*Teachers are not coaching the students* *At the flower farms the workplace learners are not always aware of what the students need to be doing at their farm.*	The workplace learns are not aware of what is demanded from them. The Flower farms are commercial businesses if they don't see the benefit they don't want to invest time into it.
8. A basis for a lifelong learning attitude for students is realized	*The teachers are not always aware of the working conditions in the flower farms. There is no module on career development in the curriculum. Teachers told students, after graduation you can become a supervisor or manager in a commercial flower farm and earn around 500.000 Ush.*	There is a mismatch between what was told to the students about their future career prospects and what the graduates are experiencing themselves working in the flower farms.

5.4 Impact on employment

As explained, the impact study was also limited to the Diploma-study program of the Agricultural college in Uganda. The final two-year Diploma-curriculum of the agricultural college, which was revised based on the NCDC (National Curriculum Development Center) comments, was not yet delivered for approval to the Ministry of Education and Sports. So the formal national approval was still pending.

Workplace learning was an integral part of the curriculum. It was seen as essential to include this to make the education program relevant for the students and the future employers. The Uganda Flower Export Association, which represents the majority of the international flower farms in Uganda, was heavily involved in securing this. All parts of the courses had a practical component of around 30-40%.

The Diploma course was set up as a private course and had delivered fifteen graduates of the first batch, of which thirteen were working in the field of the program. There were twelve students in the 2nd year but only five in the 1st year. The low number of students in the first year is attributed to the worldwide economic crisis which has also hit the floriculture sector in Uganda.

As to the first labour market entry results and the position of graduates, the first signs are positive. As stated, thirteen out of fifteen of the graduates from the first graduate generation of the partner institutions are working in the flower sector. Amongst these employers are Wagagai (near Entebbe; Dutch owner), Exclusive Cuttings (Dutch owner), Aurum (Indian owner), Jambo Roses (Ugandan owner), Maireye Estates (Indian Owner), Royal van Zanten (Dutch owner), Fiduga, Uganda Hortec, Scools (golf course) and Pearlflower. One graduate was employed by the college itself, and two are dealing in agricultural products and independent entrepreneurs. One graduate is enrolled in further studies.

A first meeting was held with a small delegation of the group of graduates. This meeting showed that the graduates were very dissatisfied with the labour conditions in the farms in which they were working. It appeared that the salaries paid by the farms were very different, and in general very low considering that the graduates have a Diploma-level. Some farms pay a monthly salary of as little as 80.000 Ugandan shillings a month for the graduates (100,000 Ush = US$ 41,49; 14-03-2011). Regarding their career development they fear they will have to wait several years (5-7) before they will be promoted to a higher level with significantly more income.

During the on-site in-depth interviews with graduates, supervisors and managers it appeared to be very difficult to get reliable information about the salaries of the graduates. Many did not want to share information about their income. Nevertheless, information on contracts and salaries could be collected from around ten graduates. Individual graduates confirmed that their salaries as Diploma-holders were low, in fact about the same as for uneducated supervisors. The maximum reported salary was 260.000 Ush per month with accommodation, breakfast and lunch. This was in fact an outlier. Excluding this case, the average monthly salary of the graduates reported is 143,785 Ush (=59,66 US$; 14-03-2011).

When asked for the salaries of other job categories, in one farm it was reported that general workers were earning 70,000 – 80,000 Ush, supervisors 200,000 – 300,000 Ush, local manager 500,000 – 1,000,000 Ush. Asking the graduate working at this farm about his salary, he told that he earned 100,000 Ush while he was working as a supervisor. The manager told that this graduate was paid 250,000 Ush.
In another farm HRM was asked about salaries; it was stated that general workers were earning 180,000 Ush and supervisors 220,000 Ush. One of the managers at the same farm however reported that general workers earned 68,000 Ush, whereas supervisors earned 150,000 – 170,000 Ush. In this case the Diploma-graduates were earning 100,000 Ush.
In still another farm a manager stated: 'Employing a graduate we put them on a training with a salary of 250,000 Ush. After three months we will have an evaluation and increase the salary to 550,000 Ush'. Asking the graduate, working at the farm for longer than one year, he said that he earns 200,000 Ush.
A graduate working for seven months at the same farm, is working as assistant manager (on paper it is supervisor). He is earning 200,000 Ush. The probation period would be six months, but nothing had been changed yet.
In still another farm, the HRM manager stated: 'For a diploma holder we pay them 180,000 – 250,000 Ush. The graduate working at the farm for two months however mentioned he earns 150,000 Ush.

Regarding contracts and payment there is little or no transparency. These citations from the interview confirm that.

- *'You get a contract, you need to sign it, but the title is not specified. … In the field I am called supervisor but I am still on probation period as a general worker. (You have a title in the field, but the salary doesn't fit with the title)'*

What is more, students have experienced that farm supervisors do not all want to share their knowledge. The supervisors who have many years of experience (and in many cases no or little education) want to protect their jobs, and may prevent Diploma-graduates to have a faster careers than themselves.

- *'I went to the General Manager and he told me that he is happy with my performance and would like to increase my salary, but he had to talk with my manager first. You have to sort things out with your immediate manager. They saw us coming and it seems they fear us. They don't want us to get near to their position. Since we will maybe take over their job. My salary is not increased yet (3 months).'*

Nevertheless the graduates are positive about the Diploma course on Floriculture, and all of them who were present would take the course again and recommend it to others.

Apart from formal aspect regarding employment, graduates were also dissatisfied with their physical working conditions. They were complaining about spraying practices for instance. Although safety regulations apply, these are not always followed up, which means that workers in greenhouses can be exposed to hazardous chemicals.

5.5 Conclusions

In this section the conclusions regarding the whole study are presented.

The research questions of the study were how the various stakeholders perceive the implementation of capability-oriented workplace learning, and to what extent this learning approach influence labour market entry and career perspectives of the graduates.

First of all we have to state that the results above and the conclusions are tentative since the study is still going on and the final impact study has not been conducted yet in Ethiopia. In the case of Uganda the labour market entry of only the first group of students could be studies at the time of the data collection, because other groups were not ready yet with their study programs.

Nevertheless there are first impressions which give good insight in what the perceptions of the stakeholders and the impact of the (first) program are.

Labour market entry and career perspective of graduates

To begin with the answer on the second research question, which is probably the most important outcome of the study, it can be stated that the outcome at the short term of the first group of students were very positive since nearly all students had a paid job in the sector after graduation. Some students could stay at the place where they did their internship, which is a good sign for the quality of the program.

However, there were many complaints about remuneration and labour conditions which make employment after graduation from this program not very attractive. On the other hand, graduates would recommend the program to other students. Career perspectives are present but only on the longer term. Most graduates were appointed as unskilled workers and they will have to wait for promotion to assistant-supervisor or supervisor. Foremen and supervisors who are at present mainly unskilled and got their positions by workplace learning are protecting their jobs and many of them do not give proper instructions and information to the graduates. This easily leads to demotivation and frustration. Employers should agree on and implement a Code of Conduct. This will make income and career development more transparent and fair. This will also have a great impact on the attractiveness of the education program, since students and candidate students are keen on labour market effects of the education program, and they already know that this is problematic, which may will most likely affect their motivation for choosing this program.

Another threat for the program is the development of international trade and subsequently the labour market development. The flower sector in Uganda is also hit by the global economic crisis. The implication of this is that the demand for labour is decreasing, which will also hurt the inflow of students. Much of the sector development is depending on the price-quality ratio of the products; if competing countries outperform Uganda, it will be more difficult to maintain the sector at its current level. Solid national economic structure policy, security of logistic chains, and further global developments are also important. Finally, the development of competing hubs and regional auctions are threats.

Regarding the workplace learning component in the program, deliberate attempts have been made to incorporate this as much as possible. In the Diploma-curriculum in Uganda this was done by including practicals, and distributed internships of 2, 4, and 8 weeks during the course of study. Regarding the placement of students in internships, UFEA plays an important

role. UFEA contacted all members of the association about the possibility of placing internships. Many farms reacted in a positive way. One farm for instance wanted six interns; another farm, which was expanding, wanted as many as were available. Placement of the students in internships appeared to be very easy. Even a farm which was not very positive about Ugandan education and their interns and graduates asked for two students for internships. In general there was a good match between the interests and professional profile of the Diploma graduates and the supervisor employment needs of the farms.
The three moments of internships throughout the program are distributed as follows:

- an internship of 2 weeks in the first year; UFEA placed the students without asking for preferences of students because they did not know the farms yet;
- an internship of 4 weeks in the first year; then students had already an idea about flower farms and the topic they would like to work on. Therefore students were invited to express their preference for a certain farm. In any case they were advised to go to a different farm than the one they visited during the first internship. This was a conscious choice, as research had shown that variation in internship places is more effective than staying a longer time in one internship place. If student preferences could not be met, UFEA looked at other places with similar crops and where students could work on their preferred topics.
- an internship of 8 weeks in the second year.

Without the workplace learning component, the study program would not have been that successful.

However, the practical workplace learning component of the education programs appears to be difficult to sustain, as there is no funding for after the project. Although being the quintessence of workplace learning, the question is whether students (or their families) can raise the required money for travel, housing and food. Effective measures, probably at the level of the sector, are needed to thwart the elimination of the workplace learning components from the programs.

Stakeholders perceptions

Coming back to the first question, stakeholders in general, are positive about most of the elements of the program. In the study in-depth interviews have been held with teachers, students, interns, graduates, supervisors and employers. As far as stakeholders were informed about the capability-driven nature of the approach, they were enthusiastic about it.

During this project of four years the teachers got the possibility to participate in several training sessions on capability-oriented. Unfortunately most of the teachers involved in those sessions left for further studies or other job opportunities. The current teachers are concerned about the future, since no training will be provided on this type of education in the near future. Their understanding of capability-oriented education is *'… to teach students on what is demanded in the commercial flower industry'.* This includes lots of practical work. Practical work includes work in the greenhouse, internships, presentations and discussion groups. How much practical work given in a module varies enormously per teacher. It ranges from 90%-20% theory in a module. The teachers understand this type of education as being very relevant, by stating that *'… it forces you to teach and learn the students what they need to be able to perform successfully in the labour market. You teach the students to become self-reliant'.*

Most teachers are also teaching in other study programs, for example horticulture study program. Some of the teachers shared that they would like to introduce this practice and student-centered approach in the other courses, since this type of education is increasing the participation of the students. Although, because of the high numbers of students they experience difficulties, not only in teaching practice, but also in the field of assessment.

6. Discussion

During the data collection for the effectiveness study various critical questions were raised.

A question is whether the floriculture diploma program is well-place in the west of Uganda. There are no flower farms in the region: they are mainly around Entebbe (where the international airport is which is needed for transporting flowers to Europe). In the beginning of the project however the idea was that the region could be developed for the floriculture sector. The climate is good, the soil is fertile, there is an airport, lorries could be used, so a cold chain could be developed. The credit crisis made this impossible, although the university staff had discussed these ideas with the regional authorities. There are two options to distinguish in the policy regarding the regional horticulture sector development: a small-holder approach in which alumni could work as a team of independent flower growers, using national loans, or an international chain approach, concentrating on large-scale green-house floriculture. Both options seem to have potential, and if a choice had been made, the university should develop a development strategy, and students should be trained for the best option (being either self-employed small-holders of employees of larger flower farms).

Critics also wondered why an industry should be supported which lacks transparency and which knows harsh working conditions. The public knows this, and therefore the sector is less attractive for students, which leads to difficulties of recruiting students for the course. This is due to those circumstances on the farms.

Another critical remark concerns the sustainability of human resources in the project. Many staff members who were trained in capability-oriented floriculture education received grants for further education at MSc or PhD level. Whereas this active further education practice is rewarding at the micro-economic level, the project suffers from the discontinuity it incurs. There are also accusations regarding using project money for private investments made by a staff member. The investment appeared not to be profitable in the long-run. One of the other partners made an allegation that the person involved probably got some money out of the project fund for his private investment.

Then there is the issue of the acknowledgement of previous learning. Flower farms do not do this. They are mainly focussing on the attitude towards work of workers. If they are able to work long hours, if they show they can perform, they will employ that person. They are not yet used to people who have prior knowledge and skills. Most workers are learning on the job, and start as casual worker; after 5 to 15 years they can may become supervisor and/or local manager. It appears to be difficult to determine the position a diploma holder should get since he or she is mostly much younger than the casual workers, supervisors and local managers.

Regarding labour absorption, the question is how many graduates the sector can employ. The flower farms together are producing on an area of approximate 210 hectares; they typically employ one supervisor per hectare and one local manager or senior supervisor per five

hectares. This means that commercial flower farms employ 210 supervisors and 42 senior supervisors. The question is whether they can provided sufficient employment for the graduates of the educational institutions. The institutes together stated that 15 graduates per year would be sustainable, which is not a lot to sustain a special program for it, especially also because the jobs the graduates can fulfil can also be taken by horticulture graduates from the institutes in the project and from other universities and colleges.

Finally, trust in the diploma course by expatriates, for instance from India or Kenya, who are employed as farm or production managers, needs to be build. Since most of the teachers never went to a flower farm themselves, the input of these managers in the course is necessary if the study programme wants to educate people to become managers in the flower farms.

Questions regarding the project remain.[3] Was it worth it? Are the results sustainable? Did the project have added value the stakeholders? Was the flow of project activities efficient? Was the project sufficiently demand-driven, what was the real demand, and whose demand was mainly fulfilled? For the project-workers involved the project meant employment. For the educational institutions who participated the project meant new students. During the project period the course had a private status, and this means direct income for the educational institution with perhaps lesser public and accountability, although a private education approach can also contribute to a higher level of labour market relevance.

Public approval

When it comes to public approval of educational programs, it is certainly important to have a good understanding of the institutional arrangements regarding approval of curricula. In our case we were dealing with a university and a college. The national approval, or accreditation, of the diploma and of the certificate course were different for both institutions. Regarding the diploma course, the university had to comply with the regulations of the National Council of Higher Education, and the college with the National Curriculum Development Center. Both are advisory organizations for the Ministry of Education and Sports, which at the end of the day approves curricula (or not). Regarding the certificate course, the university does not have to get accreditation. It will run as a private training program apart from the undergraduate and graduate courses. For the college this is different; it indeed needs approval of the national authorities. Next to this, there are the institution-internal regulations for course approval. These are also quite different for / in case of the university and the college. If both institutions develop a curriculum for identical courses, this is quite confusing.

Also, when working together with two different educational institutions, terminology is becoming an issue. This seems futile, but communication is severely challenged when staff from one institute calls a course unit a course unit, and the other a course unit a module. This is only one example, but there are many of them. Some agreement on standardization of terms is helpful here.

Education, labour market and internships

A complicating factor in projects like these is the lacking labour-market structure. There may be sector organizations, such as producers or exporters associations, but what is their real structuring power? Are they more than interests groups which are defending their markets and develop their industry? Do they have a code of conduct which is monitored? Do they employ standards of corporate social responsibility? Given the large salary differential we have

[3] This analysis is based on the Editorial in the Journal of Agricultural Education and Extension of 2010, Issue 3.

observed in the group of graduates on may have doubts here. On the other hand, in the long run a certain educational structure will have an ordering effect on the labour market.

Regarding the quality of learning and working places in the industry, there should be attention for the guidance of interns. Students and graduates repeatedly reported that their uneducated superiors are protecting their jobs and that they give little information to them, which is of course understandable. But it is in the interest of the sector that these malpractices are overcome, and that measures will be taken which are in the interest of both uneducated and educated workers. This however may require a stronger labour law, which is an issue of governance, which in turn is not so easy to realize.

A challenge related to internships is financial sustainability. The first internships in this project were financed out of the project budget. The state does not finance this (we are speaking about private courses until now). Yet, internships are being perceived as being essential course components. Families, however, see this as a burden. They are now expected to pay for the internships, on top of the tuition fees. Furthermore, the general public is ignorant as far as the international flower business is concerned. Some react in an at best skeptical way: 'Can you eat flowers?' They fear that students will not find employment in that sector and that the chances for self-employment are quite limited. Rather they advocate horticulture in general, including vegetables, fruits, coffee, tea, spices, herbs and medicinal plants. Following this path however may result in despecialisation and thus more superficial training in a broader field. It would go against the intention of the collective sector to expand the market, to improve quality, and to compete with other floriculture clusters in the world (like Latin-America).
In the first article of this journal which is about North-South partnerships, differences in ideology and values and differences in financial sustainability and independence are also important aspects. It underlines the need for professionalization and mutual understanding in development cooperation projects and partnerships.
To summarize, we think in education development cooperation projects like these, a new set of principles is needed to make the projects effective. In future publications we hope to substantiate that.

Human resource management
Then there is the issue of human resource management in the educational institution. It is important to understand what drives the members of the teams. Is it reputation of senior staff, micro-economic interests, employment opportunities of lecturers, development interests of junior and mid-career lecturers, or professional interests of individual project team members? In many cases there will be a mix of interests. It is good to know about positions of project team members involved, and to know about remuneration structures of various job levels in the educational institutions, but also of graduates. We have found salary differences of starting graduates (within one year after graduation at diploma level) in flower farms of 300%, the top-end nearly equaling the salary of lecturers in technical-vocational education and training colleges. If remuneration or other primary labour conditions are not fair or market-conform, a course will fall apart.

Next to human resources issues there are evaluation issues, which also concern lecturer (yes: and management) appraisals. It is helpful to know whether those personnel evaluations exists, and what the mechanisms of them are. This equally holds for curriculum, semester, course and module evaluations. Do they exist? Is there a close internal quality management mechanism which results in continuous quality improvement? If not, this might need attention,

before anything else can be done. Because: how will the sustained quality improvement of courses be effective if there is no quality management system of some kind?

Teacher education

The key professional group which influences the quality of learning to the largest extent, is the lecturers. In agricultural education in Uganda, teacher preparation for colleges and universities was virtually absent. The preparation of lecturers was content-driven; a BSc in horticulture or agriculture was required and teaching was appreciated as an activity that one would learn on the job, with our without coaching and supervision. Is it a wonder that workshops on competence-based education and assessment, activating teaching methods, student self-responsibility are received as if in another language? Recently however the Ministry of Education and Sports requires teachers in agricultural education to be prepared for the teaching profession. There are several specialized places where agricultural education is being taught. This however, as general technical-vocational education and training, is an area that has been largely neglected for a very long time.

This is very important, because it will enable lecturers to better understand principles of education, teaching and learning which are instrumental for preparing young graduates. These students find this interesting and it has added value for their employability and future career opportunities. In my group we tend to refer to these principles as principles for competence-based education and learning. This is just a label to indicate that the students need to acquire relevant knowledge, skills and attitudes with they themselves find important, but which are also expected of them in the world of work.

A group of lecturers in our project have been trained in these principles of competence-based education. It is quite challenging for them to facilitate the learning process of colleague-lecturers who have not been exposed to the international floriculture chain and related performance requirements. Educational imagination regarding inspiring active socio-constructivist teaching methods, scaffolding learning of complex concepts, and implementing authentic assessment methods is particularly hampered when large group teaching with scarce resources (a limited number of books, individual learning materials a lack of broadband internet) is concerned.

Sequencing project activities

Curriculum development needs quite a long time, especially when institutional and national approval is required. Many stakeholders are involved, and all have their specific institutional, professionals and personal interests. Sequencing curriculum development and the development of teaching guides hence is a major issue. In a relatively short project period, there is a lot of pressure to start the courses as soon as possible. But proper curriculum development should be preceded by a profound labour market and needs analysis. In a country where there is irregular electrical power, unreliable telephone traffic, and limited or no internet, meeting stakeholders and interviewing relevant respondents, it is quite often a matter of physically going to the locations of the stakeholders. This to see if the required persons are available, to make an appointment and come back, or to stay and have a rather unprepared (that is: from the point of view of the respondent) meeting. On top of that, visits to farmers in an attempt to articulate their needs may end up in a tricky situation that suboptimal business models and work processes are in place which certainly should not serve as role model for the sector or the students. This would imply that job and competency analysis would yield information which one would not want to use as a foundation of the curriculum. Rather, productive and quality business models would need to be taken as a starting point, and job synthesis would be the better alternative compared to job analysis.

When there is a lot of pressure on starting courses, the synchronicity between curriculum development and the development of teaching guides could be compromised. The risk is that the development of teaching guides is decelerated because certain curriculum specifications are not done yet.

Towards activity-based output-financing and planning
Then there are issues regarding project financing. In our case this was basically program- and input-based. It might be better to divert to an activity and outcome-based financing structure. This will retain momentum in the project until the end, including the study of effectiveness of the courses, impact of the project on sector development, and the implementation of quality development. Obviously, these issues take a longer time to study.

Regarding project planning and organization the individual mission-approach which was chosen could be changed into a team-oriented mission-approach. A large series of consultants have been on several missions, in many cases working with small groups of staff. Concentrated missions of larger delegations may be more productive, but then these have to be planned in such a way that they would really fit in the working schedules of the educational institutions one works with.
If this would be taken up seriously, one may run into conflicts with the claims of availability of staff involved in other development-oriented programs, because in many cases universities and colleges, who are successful in finding donors for their projects, are likely to have several education development cooperation projects running simultaneously. A complexity involved in this is that different projects (often from different countries like Germany, Belgium, Canada, Japan, the United Kingdom of from international development institutions and ngo's) use different educational philosophies and terminologies. What one project calls a competence-approach is called by others an outcome-based approach or a modular-training approach.

An issue we may have overlooked to a large extent is actual participation in education, to observe lecturers, and give them structured feedback. Also, tutoring sessions with individual students are important. The analysis of tests, exams and reports they made will give a deeper understanding of the quality of their work.

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Annex 1

Job profiles within the floricultural sector in Uganda

Source: Capacity building in the floriculture sub sector in Uganda NPT/UGA/172

2007

Corine van der Heide & Martin Mulder

1. Introduction

In December 2006, 12 floricultural farms have been visited in Uganda. All of these farms are members of UFEA. Supervisors and managers at these farms have been interviewed about their jobs, their specific tasks, and the competencies they need to execute their job. From these interviews the following job profiles can be derived.
An exception forms the job of trial supervisor. This is still a non-existing job in the Ugandan industry. Therefore, the job and competence profile have been compiled based on previous experiences.

For every profile a list of tasks and competencies are defined and a short description of the job itself. Competencies are abilities of people that can be developed. They enable people to be process- and result-oriented, and act in an adequate, goal-oriented, and motivated way within their job-situations (Wals and Wesselink, 2006).

In total six different jobs can be identified. These six jobs are divided over two levels, a managerial level and a supervisory level. On a managerial level there are two different kinds of jobs: the farm manager, and the production manager. On a supervisory level there are four different jobs: the greenhouse supervisor, the fertigation supervisor, the spraying supervisor, and the post harvest supervisor.

2. Managerial level

2.1 Farm manager (FM) – A farm manager can be seen as the replacement of the owner. A farm manager in fact manages the whole farm, covering the areas of finances, human resources, public relations, and strategic development. And (s)he should control all departments (production (via production manager), administration, accountancy, maintenance, etc).

2.2 Production manager (PM) – A production manager is in charge of the whole production process of the flowers. (S)he steers all supervisors and has regular meetings with them. Moreover (s)he is responsible for the training programs of both the supervisors and (indirectly) the workers. Furthermore (s)he should continuously follow the development of new varieties, research/developments on new production processes, know the export market and, when necessary sets up on-farm trials.

Table 1: Task list for managers within the floriculture sector in Uganda

Responsibilities	Tasks	FM	PM
Finances			
1	Write budgets / control financial inputs and outputs	+	+
2	Make orders	++	+
3	Make bookings for export	++	+
Administration			
4	Administration / Record keeping	++	++
5	Report to farm manager (written and oral)		++
6	Personnel administration	+	
Human resources			
7	Train workers		+
8	Train supervisors	+	++
9	Human Resource Management	++	+
10	Supervise supervisors and control		++
11	Observe maintenance of health and safety standards	+	++
Research and development			
12	Continuously follow developments of new varieties/ crops, materials, techniques, products, etc.		++
13	Formulate decisions supporting research questions	++	+

	14	Translate research questions into feasible trials		++
	15	Design the trial set up and define the trial protocol		++
	16	Make sure the trials deliver the decision supporting information		++
	17	Implement the trial information in the farm management	++	+
Other				
	18	Public relations	+	
	19	Control all departments	++	
	20	Plan peak seasons (equipment, inputs, personnel)	++	++

Table 2: Competence list for managers within the floriculture sector in Uganda

Core competencies	**Sub competencies**	**FM**	**PM**
Social competencies			
1	Leadership skills	++	++
2	Negotiating skills	+	+
3	Training skills	+	++
4	Communication / interpersonal skills	++	++
5	Problem solving skills	+	+
6	Know how to manage people / HRM	++	++
Financial competencies			
7	Be able to write a project proposal	+	+

8	Be able to write a budget	++	+
9	Be able to apply basic economics and accountancy	+	
10	Decision making skills	++	+
11	Be able to anticipate to the market	++	+
Technical competencies			
12	Have knowledge of basic agronomy and specific flowers	+	++
13	Have knowledge of crop management, sowing, growing and harvesting	+	++
14	Know the spray programs		++
15	Know the fertigation programs		++
16	Know about water management		+
17	Be able to forecast peak seasons (equipment, inputs, personnel)	++	++
18	Basic farm trial skills	+	++
19	Basis statistics knowledge		++
20	Basic computer skills	++	++
Other relevant competencies			
21	Able to apply international health and safety standards	++	+
22	Be result oriented (time- and production-wise)	++	++
23	Be able to speak and understand English and a local language (preferably Luganda or Swahili)	++	++
24	Accept responsibility and liability for results of actions	+	+

3. Supervisory level

3.1 Greenhouse supervisor (GS) – A greenhouse supervisor is in charge of one or more greenhouses. Within each greenhouse (s)he is responsible both for the flower production and the people working there. The main tasks of a greenhouse supervisor are to supervise the workers, to control the whole flower production from the nursery till the flowers are send to the grading hall, and to maintain a proper administration on everything that occurs in the greenhouses.

3.2 Fertigation supervisor (FS) – A fertigation supervisor is responsible for the irrigation and the application of fertilizers to the flowers. (S)he has to make sure the right amount of the right fertilizer is being applied at the right time. Besides, other main tasks are to supervise the workers that are within the fertigation department and to maintain a proper administration on the inputs and outputs related to fertigation.

3.3 Spraying supervisor (SS) – A spraying supervisor is responsible for the prevention, identification, and control of pests and diseases. Furthermore (s)he is responsible for the health and safe work environment of his workers, and has to prevent any damage that could be brought to the environment.

3.4 Post harvest supervisor (PHS) – The working area of the post harvest supervisor consists of the grading hall and the cold store. The post harvest supervisor is responsible for a correct packing of the cut flowers, making sure the flowers are ready for export. (S)he should supervise the workers and take care of proper hygiene and temperatures.

3.5 Trial supervisor (TS) –The trial supervisor is responsible for the correct execution of the trial protocol. (S)he makes sure the trial is set up according to the specifications, the crops are correctly taken care of, the data is reliably collected and documented, and takes care of the data analysis and interpretation. Furthermore (s)he supervises the workers that care the crops involved in the trials, with special emphasis on the specific evaluation parameters of the trial (spraying/post-harvest/production/etc). (S)he reports the results to the production manager.

Table 3: Task list for supervisors within the floriculture sector in Uganda

Responsibilities		Tasks	GS	FS	SS	PHS	TS
Supervise workers							
	1	Train workers (on-the-job)	++	++	++	++	++
	2	Check the workers on (removing the open flowers, removing the suckers, bending, removing fallen leaves, hard/soft pinching, weeding, sweeping the floor, keeping the beds clean, cutting the dry stems, nipping, dipping secateurs in chloride)	++				+

	3	Check the workers on (mob the leaves, measure the length, sort, bunching, trimming, bring flowers to cold store)				++	+
	4	Have daily meetings with workers	++		++		
	5	Cross checking flower quality	+			++	+
	6	Check that flowers are graded properly and handled well				++	+
	7	Check proper use of trolleys and accessories				+	++
	8	Work with the workers	+	+	+	+	++
	9	Make a work and task plan	+	+	+	+	++
	10	Check the workers on proper spraying and storage of chemicals			++		+
	11	Check the workers on proper water and fertilizer application		++			+
	12	Control the handling stages of flowers and try to diminish these				+	+
	13	Make sure people stay away from a greenhouse that has just been sprayed			++		+
	14	Check the workers on the proper execution of the trial protocol on top of the standard crop maintenance handlings.					++
Technical tasks							
	15	Identification of pests and diseases / scouting	++		++		+
	16	Take care of a uniform cut stage	+				+

	17	Store flowers				++	+
	18	Quality control				++	+
	19	Packing				++	+
	20	Spraying			++		+
	21	Evaluate the spraying			++		+
	22	Proper maintenance and running of cold rooms and compressor				+	
	23	Take soil and plant samples		++	+		+
	24	Clean buckets properly				+	+
	25	Make a water and fertilizer application plan		++			+
	26	Make time schedules for planting and for harvesting	++				+
	27	Take care of a proper environment in the greenhouse	+				+
	28	Maintain high standards of hygiene	+			++	++
	29	Supply clean buckets with treated water to the workers for the harvest	+				+
	30	Control the speed of the flowers to the grading hall	+				+
	31	Treat wooden poles if necessary	+				
	32	Make a registration program for the parameters					++

		involved in the trials					
	33	Makes agreements with the other supervisors about the specific care of the trial plots	+	+	+	+	++
	34	Analyses trial data					++
Reporting and administration							
	35	Register harvest quantities per person and per type	++				
	36	Make report of pests and diseases	+		++		+
	37	Keep records (inputs, outputs, production)	++	++	++	++	+
	38	Make weekly and monthly spray reports			++		+
	39	Make pack list for every export				++	
	40	Check workers on correct labeling				+	++
	41	Have daily meetings with GS's and PM	+				
	42	Report problems that happen in grading hall (a.o. to GS)				+	
	43	Give advise about the right selection / profitable varieties	+				
	44	Administrate the speed of the flowers from field to grading to cold room				++	
	45	Registers the specific trial parameters					++
	46	Reports the (provisional) results of the trials in a way that answers the research questions					++

Table 4: Competencies list for supervisors within the floriculture sector in Uganda

Core competencies		Sub competencies	GS	FS	SS	PHS	TS
Social skills							
	1	Training skills	++	++	++	++	++
	2	Leadership skills	++	++	++	++	++
	3	Communication / interpersonal skills	++	++	++	++	++
	4	Intercultural communication skills + Know how to deal with tribalism	+	+	+	+	+
Technical skills							
	5	Able to apply basic computer skills	+	+	+	+	++
	6	Able to use irrigation computer systems		+			*
	7	Able to store flowers properly before export				+	*
	8	Know the life cycle of pests and micro-organisms that cause pests and diseases			+		*
	9	Able to identify pests and diseases and their stage (scout)	++		++		*
	10	Able to test chemicals on a plant			++		++
	11	Know and recognize environmental factors that favour pests and diseases	+	+	++		*
	12	Know how to avoid pests and diseases and understand the importance of it			++		++
	13	Understand importance of instructions and labels of chemicals			+		+

	14	Able to use chemical equipment			++		*
	15	Know the correct mixtures of chemicals and how and when to use			++		*
	16	Able to apply the proper measures and procedures within spraying / IPM			++		*
	17	Able to store chemicals and pesticides properly			++		+
	18	Able to deal with chemical waste			++		+
	19	Have thorough knowledge about agronomy and basic knowledge of plant physiology and biology	++	+	+	+	+
	20	Able to apply climate control	+				*
	21	Able to recognize the cut stage	++				+
	22	Able to apply different types of fertilizers		++			*
	23	Know the effect of different fertilizers to the plants		++			*
	24	Able to detect deficiencies and excesses		++			*
	25	Know different types of soils and soil preparation	+				*
	26	Know how to clean buckets properly				+	*
	27	Comprehend the importance of the cold chain				+	*
	28	Basic knowledge of statistics					+
	29	Data recording skills					++
	30	Data management skills					++

	31	Trouble-shooting ability					+
	32	Basic reporting skills					++
Other competencies							
	33	Able to speak and understand English and a local language (preferably Luganda or Swahili)	++	++	++	++	++
	34	Ability to meet deadlines	++			++	++
	35	Accept responsibility and liability for results of actions	++	++	++	++	++
	36	Open to instructions	+	+	+	+	+

* The TS must be a reasonably all-round person with general knowledge of the different farm activities. Special competences (indicated by a *) might be required depending on the type of trial to be conducted: fertilization trial, pesticide trial, post-harvest trials…

Sources

- Interviews with owners, managers, and supervisors of 12 flower farms in Uganda (all members of UFEA) in December 2006.
- Wals, A. and R. Wesselink, 2006. Professionalisering van NME. Competenties onder de loep.

Annex 2

Example Occupational profiles and Curriculum Analysis for MSc graduates in Horticulture in JUCAVM, Ethiopia

Source: Capacity building in the horticultural sector in Ethiopia NUFFIC NPT/ETH/260

2008

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1. Introduction

From January till [April] 2008, [23] stakeholders in the horticultural sector have been visited in Ethiopia. Many of these stakeholders are potential employers of MSc graduates in Horticulture. Among the stakeholders were heads of research institutes, researchers, trainers, farm managers, [etc]. They have been interviewed about possible MSc-level occupations in the field of Horticulture in their organizations, the core tasks belonging to these occupations, and the core competencies that are needed for the occupations. Based on these interviews various occupational profiles were composed..

For each occupation a short description and a list of core tasks and core competencies, that are necessary to take along in the curriculum redesign process, is developed. These are presented in this document. At the end of the document comments, that were given by the interviewees on the current curriculum, are listed.

In total 8 different occupations can be identified. These are researchers, trainers/teachers, consultants, extension officers, private investors/entrepreneurs, managers, development workers, and policy makers. These 8 different occupations have been put together in three groups because of the fact that many of the tasks and competencies of the occupations were overlapping.

Group 1 are researchers, working in a variety of research institutes.
Group 2 consists of occupations that are mainly aimed at collaborative learning and co-constructing knowledge and/or innovative policies and practices. These are trainers/teachers, extension agents, development workers, policy makers, and consultants.
Group 3 represents the occupations that strongly relate to managing a business. Identified occupations in this group are managers and private investors/entrepreneurs.

The occupational profiles have been used to redesign the curriculum of the MSc Horticulture program at Jimma University College of Agriculture and Veterinary Medicine. It helped to align the MSc qualification with the needs of the various occupations. And it helps to identify the present gap between the current MSc-curriculum and the reality of work.
By visiting and interviewing the horticultural stakeholders and thus involving them in the curriculum redesign process, their commitment with the new MSc in Horticulture may increase. Future involvement will enhance quality improvement of and trust in the MSc program and the respective graduates.

2. Group 1: Researchers	
2.1 Core learning task – Execute (applied) research in an academic way from the beginning (write a project proposal) to the end (present findings, write a research report)	
2.2 Subtasks	2.4 Core competencies
- Identify and prioritize horticultural problems (at different levels: farm/region/national) - Analyse data - Write proposals - Conduct independent and/or multidisciplinary research - Applied research, specific to interest of commercial farms, or in the local community - Keep up to date with new developments (e.g. technological, governmental, procedural) in the field and planning ahead towards (costumer trends) - Visit the field - Propagate plants; using tissue culture, unusual types of seed production, stem cutting, layering, grafting, budding, specialized structure and micro-propagation - Research on irrigation intervals, pests and diseases, nematodes, spider mites, chemicals, IPM, biological control, micro-climate conditions, radiation, humidity, nutrient studies, water quality, post harvest (quality control), preservation of chemicals, environmental friendly growing, possibilities to get clean water, improvement of plants (including yield, resistance, quality), propagation methods - Produce and breed different varieties of horticultural crops - Manipulate growth and production of horticultural crops - Develop guidelines for integrated plant nutrient management - Develop new varieties - Profile quality parameters of selected horticultural crops - Appraise environmental conditions of produce after harvest and optimize environmental factors in prolonging the shelf life of perishable horticultural crops - Conceptualize, design, implement and evaluate solutions in alleviating post harvest losses - Manipulating plant growth environment - Prepare media mixes and method of sterilizing - Select and develop sites for horticultural production (planning at regional / national level) - Communicate findings	- Be able to write and defend a research proposal - Be able to defend research findings - Be able to work with statistics and software on statistics - Be able to translate theoretical/scientific findings into practical applications - Be able to observe, scan, and investigate an environment - Be able to use appropriate quantitative and qualitative data collection methods - Be able to identify relevant research needs and topics - Be able to select and develop varieties - Be able to test soil nutrients - Be able to work with different factors affecting fertilizers efficiency - Be able to apply different breeding techniques - Ability to determine post-harvest losses encountered in the industry and know how to ameliorate them - Ability to appraise maturity stage of selected horticultural crops using different techniques - Ability to appraise quality of horticultural crops objectively and subjective leveraging on certain physical and biochemical parameters - Be able to provide plants with optimum conditions - Be able to prepare sterilized media and able to identify media mixes for particular plants and for seedling and rooted cutting growth - Be able to apply the systems of seedling production - Be able to apply the techniques of vegetative means of propagation and micro-propagation techniques - (Rural) marketing skills (how to sell/commercialize your findings) - Be able to explain to outsiders the contribution of biotechnology for plant improvement - Be able to keep up with new developments and use this in research - Be able to perform participatory activities and rural appraisal - Be able to do applied research, specific to interest of commercial farms - Be able to work in a group - Be aware of own capabilities and knows own strengths and weaknesses

3. Group 2: Trainers/teachers, Extension agents, Development workers, Policy makers, and Consultants	
3.1 Core learning task – Facilitate collaborative learning and innovation processes for sustainable development of horticulture practice	
3.2 Subtasks	3.4 Core competencies
- Make training manuals - Theory trainings e.g. on NPS, IPM, safety issues - Practical trainings e.g. on how to cut flowers, how to spray, post-harvest, IPM - Train on side issues e.g. environmental, social issues, HRM - Keep up to date with new developments (e.g. technological, governmental, procedural) in the field and planning ahead towards (costumer trends) - Train and/or advice on new technologies, new developments in quality management, and new products, like agro-chemicals - Guide the farmer during execution of new developments - Take care of sustainability aspect - Create and manage quality standards - Follow relevant regulations and procedures from governmental bodies like MoARD - Identify current horticultural problems in the local community - Map and scan communities and their resources (do applied research) - Propose possible solutions and action plans, taking into account the community resources - Link different involved stakeholders relevant for identifying, studying and solving the problem - Write reports and action plans usable for community and responsible local institutions - Teach in high-learning institutes or universities on specific horticultural subjects	- In-depth (applied) theoretical knowledge on and practical experience with horticultural issues (including environmental issues, social issues, marketing and finances, labour requirements, (water and environmental) policies, quality standards as GAP, NPS, etc., cost-benefit analysis, newest technologies and developments, ICT) - Interested and able to do trials - Be able to perform participatory activities and rural appraisals - Have experience with various training methodologies - Able to use different training aids - Be able to develop training and/or teaching material - Presentation skills - Be able to write practical reports and action plans, directly usable for users - Be able to translate theoretical and scientific knowledge and new developments into practical trainings and practical recommendations/advises and training material - Be able to demonstrate proposed solutions to the community and support the implementation - Able to interact and work with (train/consult) a variety of target groups (workers, supervisors, managers, farmers, students, colleagues, other technical consultants) on an appropriate level - Be able to use problem solving skills in an innovative and creative way based on (im)possibilities of the community - Be able to manage variable work flows - Showing ambition, commitment and willingness to help the community - Have a positive attitude to people - Be calm, not hot temperate - Willing and able to work in a team - Interdisciplinary team working skills - Be able to deal with regional and tribal differences (intercultural communication) - Be aware of own capabilities and knows own strengths and weaknesses

4. Group 3: Managers and Private investors/entrepreneurs	
4.1 Core learning task – Lead and finance a business, human resources, and handle technical issues	
4.2 Subtasks	4.4 Core competencies
- Make production (physical/technical) planning - Select optimal locations (elevation, climate, etc.) - Manage disasters e.g. during a hail storm - Control production process - Control resources - Oversee farm activities - Write a business plan - Coordinate, monitor and evaluate every division (is progress according to plan) - Set up and develop agribusiness and/or organization - Promote products - Lead subordinates / labour management - Divide labour and link jobs to the right employees within an organization - Meet external stakeholders (clients, colleagues, competitors, policy makers, etc.) - Make financial planning / budget - Manage finances - Keep actively up to date with new developments (e.g. technological, governmental, procedural, customer/export requirements) in the field and take them into account when planning or developing marketing plans - Search pro-actively for both market and technical possibilities and information - Identify and analyse potential market opportunities to establish corresponding business - Check product and market price, and adapt price accordingly - Analyse market and production opportunities - Perform cost-benefit ratio analysis - Conduct risk assessment - Arrange the right support for specialist tasks	- Technical knowledge and skills on the crop (how to produce, how to spray, how to control the weed, etc.), on fertilization, chemical application, post-harvest, crop protection, pests and disease management, resistance management, etc. - Knowledge on farm design / engineering knowledge - Be able to execute a trial e.g. on chemicals or variety selection - Be able to write practical reports and action plans, directly usable for users - Presentation skills (both written and oral) - Knowledge of project planning and management - Be able to prepare, monitor, and evaluate action plans - Be multitasking and multi-dynamic - Be able to handle stress situations - Be creative - Be able to manage labourers, motivate and develop them - Be able to keep discipline - Be able to deal with tribal differences / intercultural communication skills - Leadership skills; (a manager should be able to act as a boss ánd as a friend) - Be able to work in a group - Be able to work with and communicate effectively with employees, subordinates, stakeholders, clients, farmers, bosses - Be open-minded - Be aware of own capabilities and knows own strengths and weaknesses - Knowledge of financial administration / financial management - Be able to do market analysis for variety selection - Be able to react on market developments - Be able to react to new scientific developments - Be able to commercialize ideas, products, and research findings - Be able to recognize market potentials - Be able to set up and develop production or marketing plans and conduct marketing strategies for specific crops - Be able to translate new developments and consumer trends into production and management plans

[i] Further research is necessary to support the findings in this study. A next round of data collection is planned in September 2011.