Perspectives and limitations of Finnish higher forestry education in a unifying Europe

Annette Schuck
Department of Forest Production Science
Faculty of Forest Sciences
University of Joensuu, Finland

Academic dissertation

Title of dissertation: Perspectives and limitations of higher Finnish forestry education in a unifying Europe

Author: Annette Schuck

Dissertationes Forestales 78

Thesis Supervisors:
Prof. Paavo Pelkonen
Department of Forest Production Science, University of Joensuu, Finland.
Dr. Stefan Werner
Foreign Languages Department, University of Joensuu, Finland.

Pre-examiners:
Prof. Dr. Siegfried Lewark
Institute of Forest Utilization and Work Science, Albert-Ludwigs-University, Freiburg, Germany.
Prof. Eduardo Rojas-Briales
Department of Plant Production, Polytechnic University of Valencia, Spain.

Opponent: Prof. Andrew Cobb, Harper Adams University College, United Kingdom.

The aim of this exploratory study was to increase the knowledge about processes driving educational change in Finnish higher forestry education required by the Bologna Process. An analysis of implemented changes at 8 European universities in four countries delivering higher forestry education was conducted to compare the development in Finland to trends in Germany, Austria and The Netherlands. An international trend to broaden the scope of studies in forest sciences as well as the transferred competences was observed, which resulted in a renaming of most faculties and the degrees offered. In Finland and Germany the relationship of degrees delivered by universities as opposed to universities of applied sciences was problematic and there was a reluctance to introduce labor-market relevant Bachelor degrees at university level. Stakeholder involvement during curriculum development was at minimum level at most surveyed faculties. In other surveyed countries, forestry studies had undergone a low in enrolment during the observation period, while in Finland they were of constant attractiveness for Finnish as well as for foreign students. However, also here trends leading to short-term and part-time employment, as well as longer periods of unemployment of new graduates were visible. Surveys among Finnish and foreign students in Finland and Finnish stakeholders were conducted to analyze the perceived national need for change. Students in Finland believed that most relevant for finding a job would be application skills, as well as economic and international forestry knowledge. In general, students were satisfied with their studies, but disappointed about the quality of teaching and particularly with the employment situation in Finland. Application skills and entrepreneurial spirit were valued highly by Finnish stakeholders, with skills in a foreign language as a precondition for forestry graduates. Perspectives are a focus on application orientation for the undergraduate degree (with profiling considering degrees offered by universities of applied science) and on research and development for the graduate degree as suggested by Finnish stakeholders. A continued focus on economic aspects at the University of Helsinki and specialization on environmental, social and international aspects of forest science at the University of Joensuu appears desirable for profiling at the MSc level. Limitations are set by the current employment situation in the European forest sector requiring structured curriculum development and regular surveys of stakeholders to adjust the labor-market profile of forest science degrees.

Keywords: forest sciences, curriculum development, Bologna Process, Bachelor degree, stakeholders, quality assurance.

Acknowledgements

Freiburg, July 2008

Annette Schuck

TABLE OF CONTENTS

6

Abbreviations and Acronyms

BP	–	Bologna Process
BSc	–	Bachelor of Science (undergraduate degree)
DRE	–	University of Technology Dresden, Germany
EHEA	–	European Higher Education Area
FFF	–	Future Forum on Forests
FRE	–	Albert-Ludwigs-University, Freiburg/Germany
GOT	–	University of Göttingen/Germany
HEI	–	Higher education institution
HEL	–	University of Helsinki/Finland
HFE	–	Higher forestry education
ICT	–	Information and communication technology
JOE	–	University of Joensuu/Finland
MSc	–	Master of Science (graduate degree)
MSc EF	–	MSc European Forestry
MUN	–	Technical University Munich/Germany (TUM)
QA	–	Quality Assurance
UAS	–	University of Applied Science(s)
VIE	–	University of Natural Resources and Applied Life Sciences, Vienna/Austria
WAG	–	Wageningen University/The Netherlands

1 INTRODUCTION

Forestry education at European universities has changed radically during the last two decades. One important reason for this was the so-called Bologna Process that started with the ratification of the Bologna Declaration by 29 European Ministers of Education in 1999. The signatory countries agreed to harmonize European Higher Education and to introduce a common credit system and a common system of qualifications, due to the perceived "need to establish a more complete and far-reaching Europe, in particular building upon and strengthening its intellectual, cultural, social and scientific and technological dimensions" with "the objective of increasing the international competitiveness of the European system of higher education". The process has entered a Pan-European dimension with the number of signatory countries growing from 29 in the original Bologna Declaration (Bologna Declaration 1999) to 46 in 2008 (Bologna Process 2008).

At the same time forestry and forest sciences had to face changes in many European countries, such as a decline of the economic importance of the forest sector with a simultaneous rise of importance of ecological and social, and most recently cultural issues related to forests. Also the labor market profile for university graduates underwent a radical and swift change with the necessary curriculum changes lagging behind in pace. Some European countries felt the changes earlier, while in Finland the relative stability of the economic importance of forests softened the impact.

However, at the beginning of the new millennium the same signs of change that mainland Europe encountered already in the early 1990s also reached Finland. For this reason it proved interesting for Finnish forestry education at universities to have a look at possible solutions that have already been implemented in other European countries so as to benefit from these experiences. To enhance the understanding, details of the development of a European Higher Education Area (EHEA), the Bologna Process (BP), and the changes and developments concerning higher forestry education shall be explained in detail in the first sections of the introduction.

1.1 Competitiveness of higher education institutions (HEIs)

During the last 9 years, the BP, starting in 1999 with the Bologna Declaration, has been implemented to harmonize European Higher Education. The BP is meant 'to facilitate mobility by providing common tools to ensure that periods of study abroad are recognized. These tools are used to promote transparency in the emerging EHEA by allowing degree programs and qualifications awarded in one country to be understood in another' (European University Association 2008). Since European lives are more and more dominated by a global free market economy and stakeholder value rather than by national political decision making and state regulation, this trend was also able to take a foothold in education, one of the last bastions of state regulation in Europe.

The development of internationalization of higher education can be described in terms of four quantum leaps according to Teichler (1999a) and Hermans (2005):

- from vertical cooperation to cooperation on equal terms
- from casuistic action to integrated policies

- from separated international education activities to integrated [activities] in the mainstream education
- from mono-cultural institutions to multicultural institutions.

European higher education institutions have indeed started to change due to competition from abroad made relevant by the mobility of students, staff and graduates, and the increasing availability of information on quality, such as university rankings and accreditation of study programs. Competition is defined as "rivalry in the market, striving for custom between those who have the same commodities to dispose of", and competitive is defined as "organized on the basis of competition" (Oxford English Dictionary 2008). However, applying these terms to education proves difficult, because historically educational institutions tended to be non-competitive, heavily regulated and subject to cultural differences (Belfield 2000). Furthermore, public universities have in many European countries never been threatened in their dominance by private institutions. Moreover, Wals et al. (2004) mention "the deeply entrenched patterns of reductionist and disciplinary thinking that characterize so many institutions of 'higher education' as one of the barriers of adopting an integrated approach to curriculum development".

Due to disappearing borderlines and the Internet there is now more choice for students in Europe, and also more information. At the same time students have to work harder and to be more efficient, if they want to compete in a globalized world. The students' choice of education depends on certain expectations towards the content of the studies and also the perceived usefulness of the studies on the labor market. A problem is constituted by the fact that "future expectations cannot be operationalized, the uncertainty coupled with them cannot be specified and in addition, the time horizon of the expectations is difficult to determine" (Tikkanen 1981). At the same time, when choosing education (particularly higher education) as a "means to generate, accumulate and maintain human capital" it has to be remembered that *education serves as a consumption good <u>and</u> an investment good* (Belfield 2000). This fact makes it difficult to quantify competitiveness of educational programs as well as educational outcomes in monetary terms.

As a **consumption good**, the competitiveness of higher educational programs can be assessed in terms of <u>attractiveness of the discipline for potential students</u>. The attractiveness of the discipline for students is further related to other important factors: the attractiveness of the location of the educational institution, the image (and tradition) of the discipline, self-promotion of the institution, subject-specific content, attractiveness and profile of related disciplines or other institutions delivering similar education, as well as many other factors (e.g., media discussions of subject-specific content covered by the discipline, social relevance, or trendiness). As an **investment good**, the <u>attractiveness of the graduates on the labor market</u> can serve as an indicator. It is in part based on the competence profile (Oxford English Dictionary 2008. Definition: "sufficiency of qualification; capacity to deal adequately with a subject. We see the competence profile as a holistic unit consisting of subject-specific knowledge, skills and aptitude of an individual") provided, but is to some extent also dependent on the above mentioned factors influencing students (image, media coverage, profile and image of related disciplines and educational institutions, etc.). The impact of these factors is again not easily quantifiable and the perception of these factors by the general public can deviate considerably from the perception of experts in the field. Moreover, the perceptions and judgments of individuals can be based on reliable information, on subjective opinion or on questionable sources. Belfield (2000) expresses

this with the dichotomy of taste/preference as opposed to information/knowledge (**Figure 1** gives a summary of the discussed elements involved in competitiveness).
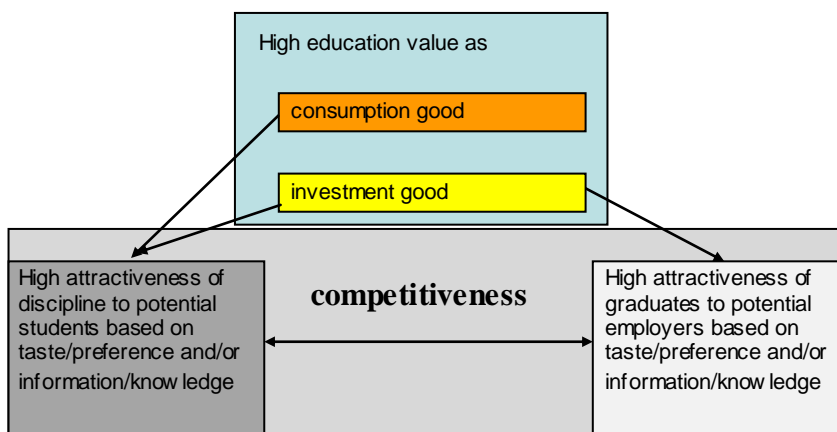
Figure 1. Factors influencing competitiveness of higher education.

The two dimensions of competitiveness are closely but not directly related to each other, since the employment potential depends on an unknown labor-market situation at the time of graduation (and not at the time of enrollment). While attractiveness to potential students can be influenced by the attractiveness to employers and the value as a consumption or investment good, higher education curricula have in the past hardly been influenced by analyses of these factors. Furthermore, higher education institutions differ with respect to input (budget, staff, and students), transformation processes, measured outputs and valued outcomes (Shavelson and Huang, 2003).

On an international level, the competitiveness of higher education programs is closely related to comparability of degrees and qualifications, which in turn depends on transparency and ultimately on quality assurance (QA) based on commonly agreed indicators. If these indicators do not exist, foreign students are left alone with a discussion about the adequacy of their degree when and if they return home. Additionally, the international labor market in the field is extremely important, but difficult to monitor.

1.2   The Bologna Process

The Bologna Declaration (1999) emphasized the importance of transparency, harmonization and quality assessment for the EHEA. The Declaration committed the signatory countries to (in short)

- the adoption of a system of easily readable and comparable degrees,
- the adoption of a system essentially based on two main cycles, undergraduate and graduate,

- the establishment of a system of credits as a proper means of promoting the most widespread student mobility,
- the promotion of mobility by overcoming obstacles to the effective exercise of free movement for students, teachers, researchers and administrative staff,
- the promotion of European co-operation in quality assurance with a view to developing comparable criteria and methodologies.
- the promotion of the necessary European dimensions in higher education, particularly with regards to curricular development, interinstitutional co-operation, mobility schemes and integrated programs of study, training and research.

Thus the Declaration aimed at enhancing the competitiveness of European higher education by establishing a harmonized system of QA meant to lead to a harmonization of the EHEA. The following BP has pushed the development of common indicators for QA in Europe. The process was initiated due to the internal integration process of the EU, and, furthermore, by the need to compete with other attractive locations of education, e.g., the United States of America and Asia. While educational quality was not mentioned in the precursory Sorbonne Declaration (Sorbonne Declaration 1998) at all, and only once in the Bologna Declaration (Bologna Declaration 1999), it was already mentioned 17 times in the follow-up Berlin Communiqué (Berlin Communiqué 2003, Saarinen 2005) and 20/21 times in the Bergen and London Communiqués, respectively (Bergen Communiqué 2005, London Communiqué 2007). Saarinen (2005) further elaborates that "the implicit need for QA is the ideology of consumerism: the students and employers have a right, as consumers of education, to obtain information about the standard of education".

But how can educational quality be defined and measured? Shavelson and Huang (2003) suggest a heuristic framework to clarify "the purposes and goals for learning in higher education against proposed measures of those goals". Furthermore, they suggest that there is a need for a conceptual framework that "would link statements of outcomes to actual student learning and achievement, which could be linked in turn to specific tests and assessments" that "allow us to map any proposed assessments onto the particular kinds of knowledge and abilities that are valued highly by multiple stakeholders as cognitive outcomes of higher education". But these kinds of knowledge and abilities need to be mapped first. Stakeholder views could help local implementation of QA while streamlining national and international policy based on the principles described in the Bologna Declaration (1999). Stakeholders with multiple educational backgrounds are particularly important because whenever we have been socialized through education, "we have difficulty envisioning an education substantially different from ours" (Fisher et al. 2005).

The change to a EHEA has lead to a new definition of educational aims based on a European perspective. As Teichler (1999b) observed, new research about the relationship between higher education and work is needed and must consider international trends towards:

- 'precarious' or 'flexible' employment
- a 'mass' or 'abundance' paradigm
- a 'life-long learning society'
- an 'international' or 'global' labor market

European governments as well HEIs have been involved in structural changes for seven years now, and the new structures are slowly emerging. These changes in the higher education landscape affect all disciplines, including forestry.

1.3   Higher forestry education (HFE)

One objective of this study is to increase the knowledge about changes that have occured in higher forestry education in four countries (Finland, Germany, Austria and The Netherlands) during the years between 1999 and 2007. The results will be used to evaluate the perspectives and limitations for Finnish higher forestry education. Also European HFE has been strongly affected by the aforementioned developments, since the international exchange of students at some of these HFE institutions has increased dramatically between 1990 and 2004 (Schuck and Pelkonen 2006). Apart from changes in the EHEA, educational programs are also heavily influenced by societal development that affects the day-to-day reality of professionals (Pelkonen and Schuck 2006). In forestry and forest sciences many such changes have been recorded. Bartelink and Schmidt (2006) identified three relevant trends playing a key role in current demands concerning European forestry curricula, namely the

- "changing roles of forests in also changing societies…
- increasing standardization of the higher education in Europe…
- increasing emphasis on skills and competencies, rather than on traditional knowledge."

HFE in Europe has a long tradition based on forest management principles developed in Central Europe, initially to protect the hunting and land rights of the nobility (Kennedy et al. 1999) and later to serve "the human needs to preserve and utilize forest resources" (Pelkonen 2004). Sustainability as an idea and management principle was coined by foresters almost 300 years ago (Vicentini 2005) and the idea spread around the world during the 19th century. As Kennedy et al. (1998) elaborate "foresters and other science based professions began this [the 20th] century as heroes… they aspired to be scientifically powerful and pure, uncorrupted by self-interest or politics, and trustworthy to pursue public good".

Traditionally, HFE emphasized economic and technological aspects of forest management (Pelkonen 1998, 2004) which was also reflected in forest research. After World War II, things changed when companies intensified industrialized use of forests and eventually clashed with the environmental movement in the United States and Europe in the 1970s and 1980s (Hellström and Reunala 1995). The emerging public conflict took foresters completely by surprise. Even in Finland, the land of forests and the forest cluster, the disenchantment was total: "the relegation from the role of carrier of the national flag to culprit of an ecological disaster was a major blow to the industry and obviously regarded as wholly unjust" (Saastamoinen 1996). With the rise of the environmental movement, the focus of forestry had to shift from mainly considering economic sustainability of forest resources to a more holistic view or, as Kennedy et al. (1998) called it, from a 'machine-model view' to an 'organic-model view'.

The extension of the sustainability principle from economic and ecological dimensions to the inclusion of social as well as cultural dimensions (Rannikko 1996 and 1998, Suda

14

and Beck 1998, Pelkonen 2004), encompassing 'a form of sustainable development which meets the needs of the present without compromising the ability of future generations to meet their own needs' (Brundtland 1987) had a further impact on HFE. Kennedy at al. (1999) continue, "those who care for and manage forest ecosystems… are again challenged to adapt their values and management concepts to be as socio-politically and environmentally effective in the current societal transition as they were 100 years ago".

Socio-economic aspects in forestry gained importance in the late 1990s, whereas socio-cultural aspects are only recently on the rise worldwide. The pace of change, however, is still mainly set by perceived national relevance of an issue. Social and societal issues are closely related to forestry and 'forestry education together with forest science has to be able to define the credible balance of rights and responsibilities of human thinking and actions along the long chain between the local people who are working in and for the forests and global stakeholders' (Pelkonen 2004). HFE has already started to move from 'the need to train 'dirt foresters' for timber management careers that start in the field… to ''forest managers' with more communication, financial, personnel, and advanced computer skills" (Fisher et al. 2005). However, societies are dynamic systems that change and with them forestry and forest science as they are practiced also have to change (Saastamoinen 1996, Kennedy et al. 1998, Sample et al. 1999, Schanz 1999, Nair 2004). Globalization and the broadening of the term forest-based industry to forest sector and recently the forest cluster, illustrate a broadening view of the fields of expertise involved. Saastamoinen (1996) defined that the forest cluster encompasses "machinery and equipment construction for paper, pulp and woodworking industries, the production of logging and transport machinery, chemicals and other intermediate products for forest sector industries as well as know-how and other infrastructure services". The change in terminology is only one indicator of the stretching borders of what is perceived to be the practical foundation of forest utilization, and thus consequently the core of forestry education.

Moreover, interest in information services that forest sciences can deliver has increased in the last decades and particularly since the late 1990s, because 'the number of stakeholders interested in forestry has increased due to internationalization and globalization of trade and environmental movements. In this context forests are widely seen as a common, global, resource, for example in basic ecological processes like carbon and hydrogen cycle, and preservation of biodiversity. In a short period of time the locally oriented field of forestry was at the centre of global discussion and decision making' (Pelkonen 2004). According to Brown (1999) 'foresters are no longer trusted professionals but are expected to negotiate and then implement a workable consensus in a polarized political environment'. Undoubtedly, the educational sector (and specifically HEIs) and research institutions are generating socially relevant knowledge and help its integration into the development of societies. This is also true for the forest sector (Niskanen and Pelkonen 2005). Traditionally, HFE is at the interface between science and application; an applied discipline that has heavily drawn from research methodology developed in more specialized fields and adapted this knowledge to the needs of forestry. Even though the focus (forests) has been narrow and aimed at specialization, the methods applied in research have been numerous and broadly based (Huss and Schmidt 1998). Thus, forest sciences graduates are methodological generalists with specialized expertise: the application of a broad range of methods to forests. This already indicates a potential conflict with universities of applied sciences or polytechnics in many countries, since a clear-cut division of application versus research in education is disappearing.

While demands for better social skills of forestry graduates in relation to broad forestry expertise undoubtedly increase (Brown 2003), traditional organizational structures streamlining forest production and management in Europe have in the last two decades been shifted from the public to the private service sector resulting in a crisis in employment for graduates from traditional HFE programs (Lewark et al. 1998). This development is due to

- globalization of markets and policies;
- new EU policies for rural development;
- reduced involvement of the public sector in forestry;
- organizational changes in industrial and commercial companies; towards leaner and more flexible models;
- development of 'green markets';
- expansion of university education in the public and private sectors.

A difficult employment situation caused by a reduction of jobs in the traditional field of forestry was followed by comparatively low student enrollment in several European countries in the 1990s, e.g. in Britain and Germany (Miller 2004). Switzerland even stopped HFE altogether. Consequently, while implementing the Bologna requirements, it appears necessary that 'in order to increase its competitiveness, forestry education has to analyse the needs and requirements of its clients for the next decade' (Pelkonen 2004). At the same time when national enrollment decreased, student mobility often started to increase and more international students saved forestry faculties from economization.

For a holistic picture of internationalization of HFE in Finland it was necessary for our research to include an international perspective to map the terrain of current trends of development in HFE. Nevertheless, the analysis focuses on the situation and implementation in Finland. The countries in which the additional surveys were conducted were mainly chosen based on the similarity of their HFE system (and the forestry education system of the country including both universities and polytechnics/universities of applied sciences) and the relative homogeneity of the stage of development along the Bologna guidelines, but also due to other relevant reasons that shall be explained in more detail later on. The Nordic perspective did not prove of great interest, since the exchange of students between Norway, Sweden and Finland was not predominant.

The study was also not meant to provide a complete overview of the European situation, but rather to highlight certain aspects relevant to the development of Finnish HFE institutions which were also relevant in another countries, e.g., the future of a forestry bachelor's degree on the labor market or the relationship of polytechnic (or university of applied science) and university education in a Bologna context. The aim was to look for the options and solutions other countries discussed in these matters. This required to choose countries with a similar system of forestry education. Also different perspectives within one country were of great interest, so that in Finland and Germany all relevant HEIs with broad forestry education within the country were included in the study.

HFE is taught only at a small number of HEIs in each European country, and thus is not subject to any popular rankings. As a consequence, an analysis of the situation as it concerns HFE has to come from within the discipline. Keeping the aforementioned trends of internationalization in mind, a bottom-up combined qualitative approach along the lines of methods described by Wiedemann (1995) and Flick (1995 and 2004) was developed, to look for promising indicators of competitiveness. This was considered suitable since

forestry faculties have to find local solutions on how to integrate all relevant national and international developments in a meaningful way. Since early in the Bologna Process, HEIs have to find ways to move away from parochialism ("our way is the only way – we do not recognize any other way of living, working nor doing things") to equifinity ("our way is not the only way – there are many culturally distinct ways of reaching the same goals") (Hermans 2005).

Thus, instead of using a top-down approach to first identify common indicators of quality current activities at the respective universities were analyzed. The main aim of this survey was to find out whether Finnish HFE has or will become more competitive in an international context considering the changes that are required to happen due to the Bologna Process and concerning the success of graduates in the labor market compared to other institutions.

1.4   Objectives

The main focus of the study clearly lies on Finnish forestry education and its relation to several other European countries, not creating a holistic picture of Europe but rather a case study. The research approach was divided into three main parts:

1) A comparison of developments of HFE in Finland to the situation in Central Europe (Austria, Germany and the Netherlands) was planned to allow a comparison of attitudes towards the implementation of the Bologna requirements as well as the strategies that were developed. Here the core question was: **do faculties define themselves as competitive** (competing for the same student pool/resources) **and if yes with whom do they compete** (other disciplines, other higher education institutions on a national/international level)? The questionnaire was supplemented with expert interviews at the respective higher education institutions.

2) Following the principles by Shavelson and Huang (2003) elaborated earlier, an analysis of stakeholder opinion in Finland was planned to overview expectations towards higher forestry education and in particular towards the new division into Bachelor's and Masters' degrees. The outcome is the "assessments onto the particular kinds of knowledge and abilities that are valued highly by multiple stakeholders as cognitive outcomes of higher education" asked for by Shavelson and Huang (2003). Here the core question was: **which core competences do HFE graduates need in order to be perceived to be competitive by employers?**

3) Forestry students in Finland were asked about their motivation to study forestry, their satisfaction with their studies so far and their vision on what kind of knowledge and skills they think will help them to find employment after graduation. The core question was to find out **which alternatives to HFE are considered by students, which subject-specific contents are attractive to them and which competences do they think will increase their chances to find a job?**

The aim of this study was to find out whether research of this kind can help to analyze the following issues:

- to relate the observed development in HFE in Finland to an international context;
- to relate curriculum development in HFE in selected European countries to the development of other related disciplines;
- to survey the perception of Finnish stakeholders concerning HFE and possible conflicts arising during the development of new curricula;
- whether opinions of different groups of stakeholders in Finland can explain the expectations and visions that different social groups have towards HFE and also here clarify differences in national perception and conflicts;
- whether a comparison of different national perceptions regarding necessary competences can help to streamline and form the basis of the process of change on an international level by pointing out conflicts and obstacles to harmonization;
- to analyze HFE students' perception of attractiveness of HFE and the relationship of attractiveness to employability and stakeholder opinion in Finland (i.e. competitiveness).

Uncovering the perceptions of different stakeholders could – if successful – subsequently be used to address and alleviate potential conflict during the process of curriculum development in Finland. Hereby, the collection of qualitative data over a quantitative analysis was emphasized. The latter does provide a sound basis for quantitative-structural decision making, but has limited relevance for an analysis of the relationship between education and labor-market needs (Teichler 1999b), or between students' and stakeholders' views.

The use of different methods allowed different groups to provide input at different levels of detail: questionnaires allowed to poll larger numbers of individuals, while expert interviews allowed an in-depth analysis of problematic topics. Different groups of stakeholders were questioned to allow different perspectives to be identified. This was necessary because employers often tend to focus on short-term demand and to over-estimate the role of generic competences and personality, while graduates focus on shortcomings of higher education in helping them during specific professional problem-solving. Moreover, both groups are also influenced by "specific national and professional cultures in assessing the relationships between study and work" (Teichler 1999b), emphasizing the need for a broad sample. The emerging picture derived by analyzing the responses of experts, students, graduates and employers showed surprising aspects of consensus, but also conflicts within and between groups.

2   METHODS AND SURVEYED GROUPS

The representation of societal change is problematic, because this change is dynamic and persistent, and when we describe change we can only describe a finite number of points in time. Society develops and as it does, different labor market demands are created in the forest sector as well as in the educational sector. When bottom-up strategies for change or

reform are developed, individuals and networks of individuals draw from cognitive abilities and competences. During reforms, all areas of cognitive competence are drawn upon. This makes the process complex and – initially – rather intuitive. There is a feeling of "what ought to be done" that is at a later stage in the process related to "what can be done". If there is a conflict of the two, strategies need to be developed to solve or work around the problem. The causality of changes (Schanz 1999) that we observe concerning HFE is a combination of a long-term exogenous and spontaneous societal change concerning the forest sector, and a short-term exogenous and planned change in higher education – the BP. To describe the effect of these normative and interactional changes over time, we analyzed changes in HFE over a time period before and after the Bologna Declaration (1999). The official deadline for the finalization of the BP is 2010, so the ideal and opportunistic dimensions are related to a hypothetical result of all processes of change that should also satisfy the ideal and opportunity dimensions of social reality. It is expected that from 2010 the presently linear direction of change will turn into a circular process of constant monitoring and reform due to the dynamic nature of education.

The development of new curricula is a dynamic process. Consequently, a dynamic research method as outlined by grounded theory analysis (Strauss 1987) is most suitable to analyze curriculum change. Grounded theory uses research methodology as a means to construct theories and models in a creative, dynamic process and simultaneously verifies them while data is gathered (Wiedemann 1995). This is especially appropriate in phenomenon-based research and can thus be used to analyze individual bottom-up implementation strategies in response to the BP (in its requirements a dynamic top-down process). Our rationale was based on the notion that "finding out 'what is going on' is a first step in planning for instructional innovation" (Hatch and Lazaraton 1991). The fact that the question is "what is going on" rather than "what causes it" justifies an ex-post-facto approach working with intact groups where it concerns forestry faculties and students, but also other interested stakeholders (i.e., employers, labor unions, ministries, etc.). The members of intact groups cannot be randomly selected, because the groups have already been established before the survey (in our case students or study coordinators at the forestry faculties) or need to be controlled for a background variable (in our case stakeholder interest in the future of the forest sector indicated by attendance of a seminar on the topic). As a consequence, the sample selection could not in our case be randomized and thus the results of the analysis cannot be generalized. Nevertheless, they represent the *perception of higher forestry education* by different groups of individuals – Finnish and foreign students in Finland, Finnish stakeholders and European experts in forestry education. The sum of the perceptions of these different groups is indicative of a larger societal perception of higher forestry education. This indicator of societal perception can in turn be indicative of demands concerning "ideal forestry education", consequently termed *societal demands towards forestry education*.

A theory was developed based on two frameworks. The first framework on effects of social change on forestry has been developed by Schanz (1999) who describes the four dimensions of society as: (1) *the Ideal* (beliefs, convictions, definition or social awareness), (2) *the Normative* (rules, norms, values, prescriptions or social institutions), (3) *the Interactional* (interlinked network of actions or social organization), and (4) *the Opportunity* (interlinked networks of interest or social hierarchies). These four dimensions make up social institutions. In our research we see *the Ideal* as the sum of the social awareness of all individuals concerned; related to our case study this would be the view stakeholders have concerning the content of HFE. Since HFE results in socialization into

the professional identity of the discipline (Brown 1999, Schanz 1999) – as does employment within the forestry sector – the educational and employment backgrounds need to be considered during the analysis of stakeholder survey results to avoid bias based on socialization. *The Normative* is represented by rules and regulations that concern higher education and with it HFE, such as the BP documentation. *The Interactional* is represented by networks of cooperation developed by HFE institutions. *The Opportunity* is seen primarily as the interest of stakeholders directly involved in HFE (students, staff and graduates). Moving the focus from the current state to a desirable future situation, the *Ideal* and the *Opportunity* dimensions become dominant, since future images are based on these and less on *normative* and *interactional* dimensions. Looking at the complexity of tasks related to the BP, it is clear that conflicts and limitations to change exist when trying to integrate all four dimensions. To identify these limitations, we saw a need to identify groups of individuals who can represent the four dimensions.

In this context, the second framework by Schmidt and Pettenella (1998) describing the relationships between society, the labor market, forestry education, and education now and in the future (**Figure 2**) proved to be a useful tool.
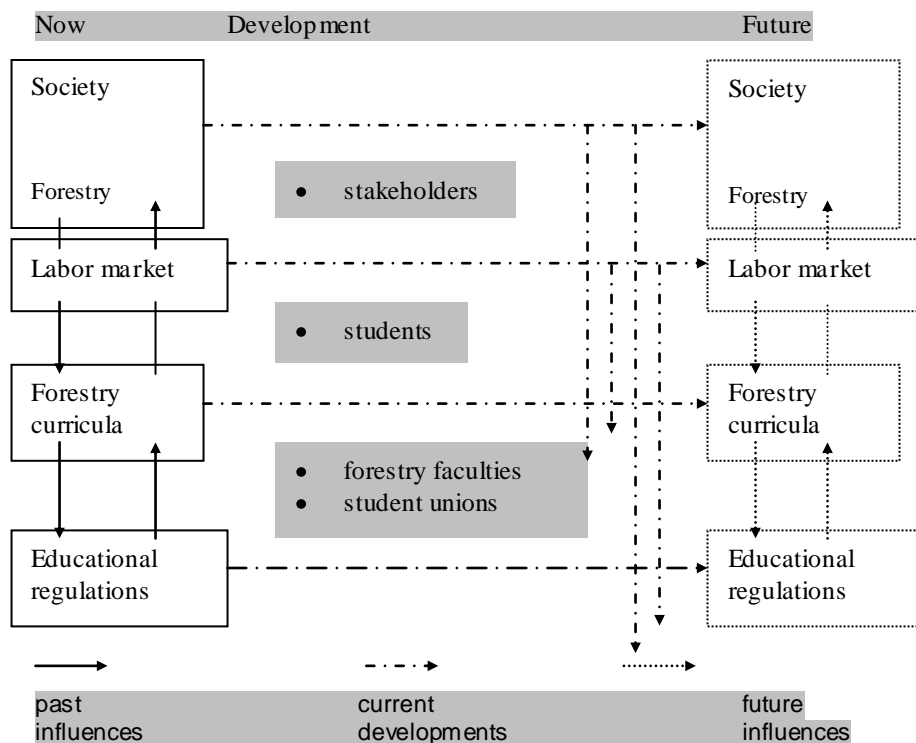
Figure 2. A model describing the relation between society, forestry and forestry education now and in the future (modified from Schmidt and Pettenella 1998, surveyed groups in this research have been added at the centre of the figure).

To analyze relevant dimensions concerning curriculum change, the surveys were planned according to the model using separate but similar surveys to poll stakeholders, students, and faculty, while student unions were surveyed with a separate questionnaire (Schuck 2006).

2.1 General outline of the research project

To map the European background situation of HFE, a *questionnaire* (Q1) was distributed to eight universities in four countries. At a later research stage, additional interviews were conducted with education experts at the respective faculties. To analyze the perception of a desirable competence profile of forestry graduates from HEI by Finnish stakeholders, a *second questionnaire* (Q2) was distributed to participants of two seminars held by the Finnish Future Forum on Forests (Future Forum on Forests 2008). A *third questionnaire* (Q3) was developed to map the perception of a desirable competence profile of graduates by students. A *fourth questionnaire* (Q4) was distributed to student unions to analyze the communication channels between faculties and their students. A general outline of the components of the study is given in **Figure 3.**
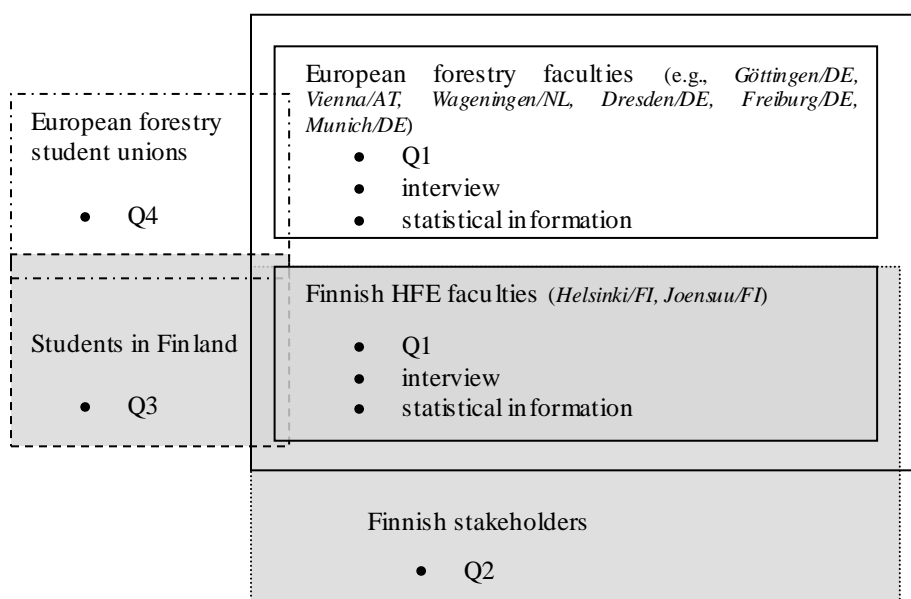
Figure 3. Questionnaires and interviews developed to map relevant, important relationships for Finnish HFE (the Finnish national context is marked in grey).

2.2 Terms and definitions of relevant terminology

According to Gonzales and Wagenaar (2003), **learning outcomes** are defined as "the set of competences, including knowledge, understanding and skills a learner is expected to

know/understand/demonstrate after completion of a process of learning" and "competences and [consequently] learning outcomes should correspond to the final qualifications of a learning programme".

Competence further represents "a dynamic combination of attributes – with respect to knowledge and its application to attitudes and responsibilities – that describe the learning outcomes of an educational program, or how learners are able to perform at the end of an educational process". Competence is split into **generic** (common to any degree course) and **subject-specific competence** (specific to a field of study). While education has always measured subject-specific competence acquired in class, the assessment of progress in generic competence is a new task. Subject-specific competence relates to what Shavelson and Huang (2003) call domain specific.

While comparing institutional organization of forestry education at universities, administrative differences became apparent. The universities mentioned in this article will be called **universities** regardless of their official status as *university* (JOE, HEL, FRE, GOT), *agricultural university* (earlier VIE and WAG, now termed university of life sciences) or *university of technology* (DRE, MUN). Organizational structures at universities differ, with forestry education being organized in *faculties, schools, study faculties or departments*. Wals et al. (2004) define a *faculty* as a ""learning organization" at the highest institutional level, where "learning systems", known as curricula, are set up". Kanowski (2001) defined a *faculty of forestry* as "a group of academic staff with interests and expertise in forestry". In this sense, all the units offering forestry education will be called **faculties** in this article**.** Institutions other than universities that teach forestry also use different names, such as *university of applied forestry*, *university of applied science(s)*, *polytechnic*, or *university of professional education*. These will be named **university of applied science (UAS),** if not mentioned in connection with the specific name of an institution. In the study we did not survey UASs.

With regards to evaluation and accreditation, Mielityinen (2004) stated that "accreditation always refers to a standard [of QA], evaluation may or may not". At the same time, Miller (2004) describes evaluation as denoting "in a stricter sense a special method" whereas accreditation is described as "the final formal decision following an evaluation procedure". **Evaluation**, in this article, describes a structured process, and **accreditation** will refer to the result of the evaluation process.

A collective of courses concerned with the topic of forestry will be called a **study program**; undergraduate (Bachelor's/BSc) and graduate (Diploma, Master's/MSc) courses of forestry will be grouped under the term **degree programs**. Earlier, there was confusion concerning the equivalence of some degree programs. Miller (2004) described the German Diploma as equivalent to the British Bachelor with Honors degree. The Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany (2003) clarified the German view of the matter: "…the following applies with regard to the weighting of Bachelor's and Master's (Article 19 HRG) qualifications and the *Diplom/Magister* qualifications in accordance with (Article 18 HRG):

- "Bachelor's qualifications always provide the same rights as *Diplom* qualifications of universities of applied science"
- "Master's qualifications provide the same rights as *Diplom* and *Magister* qualifications of universities and equivalent higher education institutions [footnote omitted]".

Consequently, in this article the German university diploma will be treated as equivalent to the Master's degree.

2.3   Background information on curriculum change

2.3.1   Faculty questionnaire (Questionnaire 1, Appendix 1)

The study had a precursor, a Masters' thesis written at the University of Joensuu analyzing increasing cooperation among seven universities, namely the University of Joensuu, FI, the Albert-Ludwigs-University Freiburg, DE, Wageningen Agricultural University, NL, the University of Lleida, ES, the Vienna Agricultural University, AT, the Warsaw Agricultural Universtiy, PL, and the St. Petersburg State Forest Technical Academy, RU (Gritten 2003). Of these, Wageningen showed the most tightly focused profile, while Vienna had the broadest scope (Gritten 2003). At the same time, Wageningen has the broadest selection of methods of instruction. One pragmatic reason for the inclusion of faculties was that all the information on courses and curricula should be available either in English, German or Finnish (c.f., Gritten 2003), which excluded Spain, Poland and Russia. Furthermore, Spain has a strong focus on Mediterranean forestry and a very different educational system compared to Austria, Germany, Finland and the Netherlands. With Finland as the focus of the case study, it was decided to gather background information about the development of HFE curricula in Central European countries (Germany, the Netherlands and Austria, **Table 1**) using a similar educational framework, and to include all the universities in these countries that deliver broad forestry education. Thus it covered some of the Baltic/Nordic (FI), North West (DE, NL) and Central European (AT) focus on forestry.

All four selected countries have historically had a rather similar system of forestry education, but forestry and the forest sector have different economic importance. While the forest sector has a higher economic importance in Austria and Finland (MCPFE 2007, p. 106), it has by comparison a low importance in The Netherlands and Germany. The forested land area in the four countries ranges from 11% (The Netherlands) to 73% (Finland) (MCPFE 2007, p. 200). There have been several studies of the initial BP induced changes of the higher education systems in the four countries (Allen et al. 2000, Kellermann and Sagmeister 2000, Kivinen et al. 2000, Schomburg 2000) as well as some more recent updates (Dittrich et al. 2004, Pechar and Pellert 2004, Tauch 2004, Welsh 2004). In 2004, there were no study fees in Finland and Germany. In Austria and in the Netherlands students had to pay on average approximately 727€ and 1445€ per year, respectively (Schwarz and Rehburg 2004). In Finland and the Netherlands the majority of students was eligible for direct financial State support, while in Germany and Austria the rate was below 25%. A comprehensive comparison of the educational systems in the countries can be found in Eurydice (2005).

The faculties were asked if they were interested in participating in the study and after they consented they were asked to name an HFE expert as contact person to whom all subsequent communication was directed. Contact persons at the respective faculties are shown in **Table 2**. They received Q1 (Appendix 1) in June 2004, asking for information about recent curriculum changes and a separate sheet for statistical information (Appendix 2).

Table 1. Surveyed forestry education units (links retrieved 19.05.2008).
* Source: Schmidt et al. 1998.

Country	Institution	Institutional organization	HFE since*
Finland	University of Helsinki **(HEL)** http://honeybee.helsinki.fi/english/	Faculty of Agriculture and Forestry	1982
	University of Joensuu **(JOE)** http://www.joensuu.fi/metsatdk/english/index.php	Faculty of Forest Sciences	1907
Austria	University of Natural Resources and Applied Life Sciences, Vienna **(VIE)** http://www.wabo.boku.ac.at/start.html?&&L=1	Department of Forest and Soil Sciences	
Germany	University of Göttingen **(GOT)** http://www.uni-goettingen.de/en/19852.html	Faculty of Forest Sciences and Forest Ecology	1868
	University of Freiburg **(FRE)** http://www.ffu.uni-freiburg.de/ffu/englisch/index.html	Faculty of Forest and Environmental Sciences	1920
	Technical University Munich **(MUN)** http://www.forst.wzw.tum.de/htdocs/fakul_en.php	School of Forest Science and Resource Management	1878
	Dresden University of Technology **(DRE)** http://tu-dresden.de/die_tu_dresden/fakultaeten/fakultaet_forst_geo_und_hydrowissenschaften/fachrichtung_forstwissenschaften	Faculty of Forest, Geo and Hydro Sciences	1811
The Netherlands	Wageningen University **(WAG)** http://www.fnp.wur.nl/UK/; http://www.fem.wur.nl/UK/	Department of Environmental Sciences	1918

The survey covered the period 1990-2004 (starting after German reunification which added a fourth forestry faculty). In 2005, additional statistical data on enrollment and information about newly introduced degrees was added to extend the time period to the year 2005.The *first block* of questions asked for details about administrational matters.

Table 2. Responding HFE experts at the respective faculties.

University	Contact person
HEL	Dr. Mika Rekola
JOE	Prof. Olli Saastamoinen
VIE	Prof. Dr. Otto Eckmüllner
FRE	Mr. Dirk Niethammer
GOT	Prof. Dr. Joachim Saborowski
DRE	Dr. Erika Lochmann
MUN	Ms Verena Kukuk
WAG	Dr. Gerrit Epema

In the *second block* <u>curriculum information</u> had to be given, as well as evaluation or accreditation of programs offered and the credit system used. The *third block* dealt with particulars of <u>student selection and teaching</u>. In the *fourth block*, the faculties were asked to outline <u>interdisciplinary, national and international co-operation</u>. The *fifth block* asked for a <u>teaching profile</u> concerning generic and subject-specific competences. Categories for generic skills were taken from a questionnaire developed in the Tuning Project (Gonzales and Wagenaar 2003), and categories for subject-specific skills were collected, modified and expanded based on the CABI publishing databases (CABI 2004) on forestry, forest products and agroforestry. All universities answered the questionnaire. The presentation of results uses the mentioned block headings.

2.3.2   Expert interviews

Information gathered through Q1 was supplemented by detailed, qualitative information gathered in interviews – a triangulation approach described by Flick (1995 and 2004). After the experts had returned the questionnaire, they were asked to take part in an interview on the same topic to deepen insight into the process and progress of change. In most cases the contact experts were interviewed, except in Dresden's case where another person (Dean Prof. Dr. Sven Wagner) was nominated for practical reasons. All interviews were conducted at the respective HEIs apart from the Dresden interview, which was held at Wageningen University during a seminar on forestry education attended by the interviewer and the interviewee. The interviews were semi-standardized expert interviews (Kvale 1996, Flick 2004) with altogether 21 questions (based on the Trends III report by Reichert and Tauch 2003) and included also guiding remarks. The interviews were conducted in English (4) or German (4) and lasted for 30-70 minutes. The interviewees were asked for consent to record the interviews, which were later transcribed. The German interviews were translated into English. During and after the interviews none of the interviewees voiced concerns about the recording or about a lack of expertise or competence to answer the questions. The transcripts (containing app. 29.000 words) were analyzed combining aspects of qualitative content analysis and global analysis (Mayring 1997, Flick 2004) to reduce the material. A first reduction is reached through paraphrasing of material with subsequent deletion of redundant paraphrases and a second reduction combining similar paraphrases.

After the interviews had been conducted a draft version of the analysis of Q1 was sent to the experts for approval. One faculty criticized the presentation of different profiles (c.f. **Tables 14 and 15**). As a result of the discussion, the final version of the tables does not present ranking values, but uses the median at each university and deviation from the median.

2.4   Other questionnaires

Based on the faculty questionnaire, further questionnaires were developed: Q2 for participants of two seminars of the Future Forum for Forests (Appendix 3) who represented Finnish stakeholders in forestry education; and Q3 for foreign and Finnish students studying at Finnish forestry faculties (Appendix 4). Additionally, a communication questionnaire (Q4) was sent to the forestry student unions of the eight faculties (Schuck 2006).

2.4.1 Stakeholder survey

For the purpose of the study, it was crucial to have access to a group of individuals who represent different educational and employment backgrounds. The respondents should have an interest in forestry issues and constitute a cross section of potential Finnish stakeholders. Since a list of subject-specific competences presented in the questionnaire required at least some knowledge of forestry terminology, it was decided to search for respondents in a forestry-related context instead of distributing it to a random sample taken from the general public. Thus, the questionnaire was sent out to 206 participants of two seminars held by the **Finnish Future Forum on Forests** (further called FFF, Future Forum 2005) coming from approximately 100 different Finnish institutions which were grouped (**Table 3**). The seminars were widely advertized and had the titles "From technology to social innovations – new models for operations in forestry" and "Livelihoods in the maelstrom of globalization". The seminars were open to anyone interested in current forestry issues.

Q2 was based in parts on surveys of the Tuning Project (Gonzales and Wagenaar 2003) which aimed at analyzing educational structures in Europe focusing on the nature and importance of competence. A Finnish translation of the list of generic competences was available and adapted. A list of subject-related fields of competence was derived from the CABI publishing databases (CABI 2005); additions were made and categories translated into Finnish.

Seminar participants were asked to rank the importance of future (until the year 2010) co-operation between forestry education units (faculties) at universities and other disciplines, and also of 30 generic and 44 subject-specific competences for the Bachelor (BSc) and Master (MSc) level using a **scale of 1 (none), 2 (weak), 3 (considerable) or 4 (strong)**. Furthermore, recipients were asked to comment on the biggest future challenge for forestry education until the year 2010.

The survey was conducted in July 2004. Some 116 of the 206 recipients of the questionnaire replied (response rate: 56%). Several questionnaires were not filled in completely, mainly due to the – as yet in respondents' opinion – unclear distinction between BSc and MSc degrees and the unclear labor market needs for the BSc degree. Thus, 16 respondents had only filled in rankings for either the MSc or the BSc degree.

Table 3. Employers of Q2 survey respondents.

Employment at/in	n (N=206)	%
Research institution	52	25.2
Administration	49	23.8
Educational institution	32	15.5
Industry	25	12.1
Consulting	12	5.8
Interest group	2	1.0
Students	2	1.0
Other	32	15.5

Background information

The background information of the 116 respondents (**Table 4**) indicates that the different groups were not of equal size. Also the sample had not been randomly selected. Consequently the results cannot be generalized, but can still be indicative of societal demands, as argued earlier.

Of the 28 women who responded, 57% had been educated in forestry and 82% were employed in the forest sector. Of the returned questionnaires, 75% had been filled in completely and on 25% rankings for – in most cases – the BSc was omitted. Of the 87 men who responded, 74% had been educated in forestry and 85% were employed in the forest sector. Of the returned questionnaires, 89% had been filled in completely and on 11% rankings for – in most cases – the BSc were omitted. One woman and three men had had forestry education as well as another type of degree. For the analysis, they were added to the group of respondents with forestry education.

Statistical analysis

To detect differences in ranking of importance between the two different degree levels (BSc and MSc), the *Wilcoxon Signed Ranks test* for related samples was used (SPSS Version 12 for Windows). Non-parametric tests are especially appropriate if the test variable data is not quantitative and/or not normally distributed. The test does not only consider the degree, but also the direction of the difference. The test computes the difference between observational pairs. Those pairs with the same values are removed and the n size is adjusted accordingly. The differences in score (*d* score) are then ranked and rank 1 is given to the smallest *d* (disregarding the sign). After the ranking is complete, ranks are assigned signs depending on whether the associated *d* was positive or negative. The null hypothesis can be rejected, if the positive and negative ranks for each group differ significantly. In the case of the analyzed data exact p-values were calculated.

Table 4. Social background information of Q2 respondents. Some individuals worked for more than one institution, thus the total for the category of employment exceeds 100%. (NA= not answered).

Background information of respondents	Response % (NA)	Male % (NA)	Female % (NA)
male:female	75:24 (1)	-	-
forestry education: other education	64:32 (4)	74:19 (7)	57:30 (3)
forestry employment: other employment	81:16 (3)	85:8 (7)	82:15 (3)
Employment at	**%**	**%**	**%**
research institution	24	25	21
administration	21	19	28
educational institution	18	16	17
industry	15	16	7
consulting	10	9	14
interest group	10	9	10
students	2	-	6
other	7	6	3

To analyze differences in ranking behavior between different groups, the *Mann-Whitney U test* (also called Wilcoxon Rank Sum test) (SPSS Version 12 for Windows) for independent samples was used to detect differences in the distribution of the rankings between groups with different social background testing the equivalence of location for two sampled populations. For this purpose, **gender** (male, female), **type of education** (forestry = foredu, other education = non-foredu) and **type of employment** (employment in forest sector = forjob, employment outside the forest sector = non-forjob) were used to construct social groups. The differences between groups were tested separately for each degree level (BSc and MSc). The mentioned abbreviations will be used throughout the results chapter. The test combines and ranks the observations from both groups, assigning the average rank in case of ties. It is then calculated how often a score from group one precedes a score from group two and vice versa. In the case of the analyzed data exact p-values were calculated and a lower mean rank indicates less importance of a given issue for the analyzed group.

To find out the issues of more than average importance for a certain ranking, the *mean of means* and the *standard deviation of means* of all rankings of importance for all issues per ranking were calculated. The issues that ranked within ±1 S.D. of the mean of means were marked as of significant importance.

2.4.2   Survey of forestry students in Finland

For forestry students in Finland Q3 (Appendix 4) was developed based on Q1 and Q2. The questionnaire was split into three different forms located on a Nexus Delfix platform [Nexus Delfix 2006], one for Helsinki, one for Joensuu and one for the MSc European Forestry students studying at Joensuu University. The questionnaire was written in English and asked students for some background information, their motivation to study forestry, their satisfaction with the studies so far, and for the importance of a list of competences in the courses they had taken so far and their judgement of the importance of the respective competences for their employment chances as graduates. The student pool was calculated as consisting of the admission to the respective faculties (JOE on average 52, HEL on average 87) during the last 6 years (graduation taking on average between 5-7 years in Finland). Thus estimated, the student pool for JOE was 312, and the pool for Helsinki 522. At the time of the survey, the pool for the MSc EF (introduced in 2002/03) consisted of three student generations that had not yet graduated with a total of 48 students. From JOE 40 students responded (based on our estimates 13%), from HEL 77 students (based on our estimates 15%), and from the MScEF program 34 (71%). Due to the rather low response rate from the Finnish students the replies have only indicative significance and are not representative. The total numbers of 40 and 77 students, however, allow a statistically sound analysis of the replies.

3   RESULTS

3.1   Expert interviews

The results of the analysis of the interviews are summarized after each question.

Question 1: *Has the Bologna Process delivered new impulses for the development of the faculty or has it only reinforced already existing efforts?*
Most experts doubted that Master's (MSc) and particularly Bachelor's (BSc) degrees would have been introduced without the Bologna Process, even though a few faculties had introduced test versions along self-developed guidelines even before the Bologna Declaration. It was felt that the Bologna Declaration had clarified political commitment:

> "Bologna has given new dynamics and yielded an intensive discussion at the political level... Now there are clear political guidelines aimed at the implementation deadline 2010 and clear structural recommendations"

Furthermore, the role of the BSc was more clearly defined, opening a discussion about the profile of university education as opposed to education offered by other institutions. According to German experts, the process supported the forestry faculties' general willingness to reform, while earlier reform plans often had to be justified at university level. All the experts mentioned that – even before the Bologna Declaration – there was intensive activity concerned with fundamental reforms, mainly due to increasing mobility of students with the consequent problem of acceptance of credits earned abroad. Mobility also gave new impetus to development of English degree programs and was expected to be further enhanced by the Bologna Process.

Question 2: *Are there Bologna requirements which are easy to fulfill for the faculty and others which are more difficult?*
The responses indicated that many requirements proved to be both easy and difficult to fulfill at the same time. The flexibility and vagueness of the Bologna documentation facilitated initial implementation of requirements, but at the same time left insecurity about definitions and goals. For example, the general idea of transition to a standardized European Credit Transfer System (ECTS) was easily accepted and fulfilled on the surface level, often using transfer factors between old and new credit system. Difficulties resulted from the necessary assessment of the work-load for an average student:

> "if it should be done thoroughly you would need to calculate it statistically over several student generations".

The Bologna time frame requires quick delivery at faculty level, while at the same time the greater picture is emerging only slowly. Harmonization and comparability require consideration of development at other institutions at national and international level, but due to the dynamic, synchronized progress many questions had to be left open. Some of these were, e.g., the modalities of transition between different degrees and educational institutions (restrictions, selection processes, selection criteria, fees), practical aspects of comparability/equivalence of degrees (standards, criteria, indicators), the definition of the content of a forestry minor, or in which time period students should go abroad during the two short BSc/MSc degrees. There was anticipation of increasing centralization and bureaucracy, decreasing flexibility as well as increasing costs and workload due to quality assurance processes.

Question 3: *Most surveyed forestry faculties reported falling/declining funding. How difficult is it in this light for the administration to cope with Bologna?*

In 2004/2005, the reforms had not been a great additional financial burden for the faculties. One reason was the continuous reform cycle imminent in the university system, as well as the availability of additional (external) Bologna related funding during the course of the Bologna Process. A second reason was that now more faculty staff participated in curriculum reform:

> "ten years ago we had one person dealing with and being responsible for these issues. Now we have a working group dealing with international issues and 7-8 people that work on all kinds of duties"

However, several experts pointed out that extra funding was granted only for a limited time and that this – together with staff reduction, diversification of degree programs and new work-intensive forms of teaching – could in the future lead to financial problems. Another mentioned aspect was the increasing demand for excellence:

> "if we plan more intensive forms of teaching we need more money or we have to reallocate money from research to teaching. The university administration does not want this, of course, because of the reputation that is aimed at, elite university and these fancy things. The reputation is in turn related to research, so there we have a real conflict".

Question 4: Will it be necessary for the faculty to do more outsourcing in the future?
Recent reorganization and the need to cut costs required outsourcing of duties and an increased use of synergies (e.g., joint use of laboratories, lectures given by external professors) with reduction of perceived redundancies. This frequently coincided with a reform of faculty structures. Nevertheless, faculties felt that they were well equipped to offer most courses internally. In Finland there were plans to share new professorships with other institutions and several faculties planned to develop joint degree programs.

Question 5: Has the university developed a Bologna strategy for all study programs or is the faculty acting autonomously? Is there a Bologna co-ordinator?
If there were Bologna strategies across disciplines and faculties they were only just emerging at most of the universities at the time of the interviews. Most universities did not have a Bologna co-ordinator, and only the expert from Joensuu mentioned their Bologna co-ordinator by name.

Question 6: Where do you find your information regarding Bologna? Is there a central information flow?
Some experts had a central information flow leading directly to them, but for most of them it was up to their own initiative to find relevant information. Still, everybody felt well informed about the process due to documents available at university web pages and on the Internet. Experts collected information from several different sources:

> "information from above is trickling very slowly to the ministries and from there to the universities. We are a bit ahead, since we also profit from our networks, e.g., SILVA, where we are informed through seminars. Also the accreditation process has been helpful in this respect…successively everyone

got involved in it, everybody read the papers and then the whole faculty was at the same knowledge level".

Problems were caused by decisions made at different points in time by different relevant decision-making bodies and criticism was voiced about the lack of clarity and streamlining of progress. Some universities obviously refrained from giving clear guidelines as a form of passive resistance. Sometimes also other disciplines were slowing down the reform process, because they were not willing to cooperate due to, e.g., excellent transition of their graduates into the labor market and consequently a high satisfaction with the old structures.

Question 7: Does forestry have an image problem?
All the experts agreed that the term *forestry* had indeed caused problems in the past, but they also expressed the feeling that this had been resolved. The general perception was that:

"10-15 years ago the traditional forestry job profile was at the center, now after surveys among new students we see that it is not in the foreground anymore".

The forestry student pool had also changed:

"the classical student was from rural areas with genetic forestry pre-disposition: father forester or forest owner. Only a few came from urban areas and then again with forestry roots. Then there were suddenly a lot of urban students. That was a shift for us, since basic knowledge from rural areas is clearly larger; they know plants etc."

In the eyes of several experts, the change of the term *forestry* (German *Forst*) in the degree program name to *forest* (German *Wald*) did the trick of shifting the image from the traditional public administration forester (a professional profile more and more willingly left to UASs) to the forest scientist. It was acknowledged that

"there is a larger thematic complex and we also want to adjust our name accordingly. There will be a broad spectrum of issues covered, natural-scientific, environmental and socio-economical topics brought into context".

Another aspect mentioned was the increasing importance of sustainability:

"young people who are really interested in the environment may see that it is not only outside, but also inside of the profession that you can improve the environmental situation …When many other industries are still speaking about how to be sustainable, we have shown that it is possible…and of course we use that in our marketing".

Question 8: Is it difficult for the discipline to attract suitable students?
At the time of the interviews, all the experts mentioned that their faculties did not have problems in attracting sufficient numbers of students, but none of them could give a comprehensive explanation for periodic fluctuations of applicants. Concerning the suitability of the students, most experts pointed out that their faculty did not select students

and consequently had no criteria to judge suitability. One German expert mentioned that the students were selected through an early "steel bath" of basic natural sciences rather than through entrance requirements or by exams. However, there was criticism that exactly the isolated continuation of school subjects (e.g., physics, chemistry, mathematics) in the early phase of the studies gave the wrong signal to young students, namely that of continuing school education. Some thought was given to a strengthening of the inter-connectedness of subjects in order to demonstrate the relevance of the respective natural science within the forest science context more clearly. A difficult economic situation and a tight labor market often gave little incentive for students to graduate quickly and caused motivational problems. Suitability was also a problem with regard to foreign students, mainly concerning the quality of their earlier education and particularly their language skills.

Question 9: *How will the introduction of new MSc and BSc degrees affect student application?*
All experts expected an either slightly positive effect of the new degrees on application numbers or no effect at all:

> "maybe more students are willing to 'risk' studying forestry, if there is a possibility to change [after the BSc degree]".

It was expected that the changes would attract

> "more external students for the MSc at the moment. It also solves a part of our labor market problem, because our students can go automatically to other MSc-s where it is easier to get a job".

Marketing of new degrees was thought to be risky if access to study programs were not restricted. Moreover, the distribution of students to the various MSc degrees offered was seen as a potential problem, because it is difficult to anticipate and regulate the student flow. Most forestry faculties planned to offer, or already offered, one forestry-related BSc degree and several MSc degrees. The multiplicity of different new forestry-related degrees offered by different institutions (universities, universities of applied sciences, and universities of technology) was expected to confuse students as well as employers.

Question 10: *The BSc is meant to be a job qualification. Which strategy does the faculty follow to make the BSc labor-market relevant?*
The expert answers ranged from "we did not find it difficult to make the degree labor-market relevant" to "we have really given it…limited labor-market validity in the sense that we really do not hope that people leave the forestry studies at the Bachelor phase" to a clear " this is a leading question. We do not like to make the Bachelor relevant for the labor market". Some experts raised questions about the definition of the term labor-market relevance. One expert mentioned that at their faculty the notion of the BSc as *qualifying for a profession* had changed to *preparing for a profession*; another mentioned that the BSc at their faculty was not seen as *qualifying for a profession* (i.e., a certain professional profile) but rather as *qualifying for the labor market as such*. One strategy aimed at making the BSc labor-market relevant was to conduct a survey to analyze the current labor-market profile. The analysis then lead to a subsequent deduction of key qualifications, followed by an analysis of staff potential and capacities, a definition of goals, and the development of

strategies to reach them. This procedure was seen as an iterative process since the labor market was perceived as unpredictably dynamic and thus requesting a polyvalent BSc. Another strategy was to establish career centers offering occupational planning and co-operation with employment agencies. Attempts to make the BSc labor-market relevant frequently coincided with attempts to broaden the content profile of study programs from *forestry* to *forests* or the even broader *environmental* or *natural resources* context, while at the same time retaining a broad basis of fundamental natural science. Several experts mentioned the need to explicitly include so-called soft skills or general (generic) competences:

> "what we hear is that the subject-specific qualification we provide is good, but what is not satisfactory are soft skills: presentation, negotiation, conflict-mediation skills… so far we have not managed to achieve that after graduation the students would be able to immediately apply what they have learned".

The transfer of general competences was often organized at university level (e.g., in form of centers for key qualifications).

Question 11: How do you inform yourself about labor-market demands regarding forestry graduates?
Experts had mainly informal contacts to the labor market: they read and gathered information from newspapers, career centers, public administration agencies, national employment agencies, labor unions, forest science societies, foresters' associations, seminars or networks. Two faculties had recently established stakeholder committees which met at regular intervals. Faculties were evidently searching for new ways to strengthen the ties with the labor market, especially also in the light of criticism of forestry education at universities not being applied enough.

Question 12: How do you describe the present labor-market situation for forestry graduates?
When asked for the present labor market chances of their forestry graduates (regardless of degree), all experts mentioned that chances were not good but also not terribly bad. They agreed that the traditional forestry profile did not offer employment opportunities for university graduates anymore, but that there were many new jobs in peripheral areas. There was concern that students needed more faculty support to find their way into the labor market because of the broadening of profiles and increasing overlap with other disciplines. Most universities had recently established career centers, but they doubted that they were used intensively by forestry students.

Question 13: Do you follow up what happens to faculty graduates?
European universities have only recently invested effort in keeping contact with their graduates. Also in forestry, alumni networks have been founded, address databases have been established and graduate surveys conducted with varying success. In some countries, data protection laws make it difficult to collect and store personal data. Another frequent problem of graduate surveys is that response rates are low and respondents tend to be employed, leaving the possibility that unemployed graduates simply do not respond. Moreover, surveys were in the past often conducted in an unsystematic and uncoordinated

way. During the interviews it was mentioned that there were plans for a concerted forestry graduate survey on a European level.

Question 14: How do you evaluate the chances of BSc graduates on the labor market?
Concerning the expected chances of BSc graduates on the labor market, most experts expressed that – at the point in time of the interviews – they were not too optimistic. One interviewee summarized the doubts as follows:

> "I expect that it will change but at this moment only the weak students stop after the BSc, because normally they stop completely. Now at least they finalize the BSc. That may give a very bad name to the BSc in the coming years".

The acceptance of the BSc by public administration agencies was judged controversially. On the one hand it was mentioned that:

> "at present they do not know where in the system to accommodate the graduates, but that will concern all degrees, also lawyers and others. They will all come with a Bachelor, so the regulation will come more quickly then expected".

On the other hand it was expected by some that "they [public administration] are not going to change anything. In principle they only need few people and they will select the best". The experts often shifted the responsibility to make degree programs labor-market relevant to employers ("ultimately the labor market will decide which graduates will be preferred"), the general future economic situation or even to the graduates themselves ("if they are courageous enough to apply and to approach employers, then there will be no big problems"). It was anticipated that there would be no big problems in the future, provided that the economic situation was satisfactory, particularly because BSc graduates are cheaper to employ and younger. Uncertainty was caused by the possibility of restricted admission of BSc graduates to MSc programs in Germany in the future potentially causing a sudden flood of BSc graduates into the labor market.

Question 15: What is the basic distinguishing feature between a forestry degree at a university and a UAS?
Although the experts mentioned the classical dichotomy *application against research orientation* several times, it was at the same time also questioned. One respondent elaborated:

> "I think it is a strategic trick. This issue has been sexed up. We do not have to accept the notion that we are not able to teach application or that our students have no competences in application".

Instead, the difference was seen in the type of inquiry:

> "while the universities of applied science emphasize the 'how' aspect, how things function, we emphasize the 'why' aspect, the wider background" or "if they come up with solutions there is one solution to a problem and they are

good in finding this one solution and coming up with it fast. Our students… come up with multiple solutions and – we hope – with new ideas, but they will be somewhat less practical. Greater flexibility of thinking that is for sure the difference I see".

Furthermore, the broader theoretical basis in natural sciences at universities was mentioned, as well as the greater emphasis on self-study. The approach to labor-market orientation was seen as a further difference:

"polytechnics are preparing graduates who have certain practical competences already needed on the labor market… we do not go so much into detail in what is required today, but we are oriented towards changes and I think that is our competitive edge".

Several respondents emphasized that the differences were not a question of quality, of education being *better*, but that the goals and strategies to achieve quality were different. Different institutions were seen as complementing each other, rather than competing with each other. German experts emphasized a cooperative approach:

"at least on a political level we want to demonstrate a common front-line and demonstrate the strengths of both sides instead of undermining each other", mainly because it was felt that "this is a competition that has been triggered deliberately and that the politicians are watching from the sidelines with glee".

Question 16: Do you expect problems regarding UASs when the new degrees will be introduced?
The Finnish experts expressed doubts about the equality of degrees awarded by universities and polytechnics in Finland, and also about the acceptance of equality of the degrees by potential employers. The other experts seemed to have accepted the equality of degrees awarded by different institutions, and there was recognition of competition of graduates from both institutions especially at the BSc level. The interviewees emphasized the differences in the profiles of the respective degree programs at universities and universities of applied science, suggesting a clarification of the profiles for employers if necessary.

Question 17: In which way do you plan to integrate the Bologna aspect of lifelong learning in the future?
The integration of this particular Bologna aspect has been postponed by most faculties. Several universities had opened centers for continuing education, but at the time of the interviews participation of forestry faculties was sporadic and mainly based on request. There was a great openness to integrate continuing education into the regular education system (via modules or courses that were open to external participants) but vision was lacking regarding programs especially tailored for an external clientele. It was mentioned, though, that as soon as demand was voiced, faculties would be willing to organize something. Continuing education was seen as a future possibility to compensate for a lack of funding and/or students. Limited demand was anticipated due to the fact that big companies organize their own continuing education and that educational needs could potentially be very diverse. Also animosities along the lines of "you at the universities

anyway know everything better all the time" were seen as potentially detrimental in this context.

Question 18: *How do you integrate the European dimension of forestry studies in the new degree programs?*
Despite increasing student mobility, European dimensions were often not explicitly addressed in forestry studies, perhaps due to the expressed attitude that:

> "we think that forestry has no national dimension, it is always a European or international dimension we look at".

International dimensions were addressed through increased networking of the faculties, and through active support of student and lecturer exchange. European and international content was more frequently emphasized in lectures aimed at foreign students. Several universities cooperated in European Master Programs, such as the Swedish Euroforester or the Master of European Forestry coordinated at the University of Joensuu, or offered a double diploma.

Question 19: *How important will networking between the European universities with forestry curricula be in the future?*
All experts agreed that in the future the importance of networking would grow, especially due to new sources of funding. Although there was more funding available for networking activities, the need was seen as even greater, especially concerning the new European member states. New legislation was expected to facilitate the introduction of joint degrees. Combined with increased mobility this was anticipated to satisfy, at least in parts, the demands for excellence, making it possible:

> "to simply make use of the different areas of competence at different universities more efficiently… One should make use of the chance delivered by the European area and use existing competences at other universities also for the own students".

It was even seen as the only chance for classical forestry education at universities to survive: "not every faculty will offer all the courses, but there will be stronger co-operation than earlier." But there were also words of warning voiced concerning the capacities of the faculties. Manifold co-operation options make it difficult to keep activities at a manageable level.

Question 20: *What kind of demands does society currently have regarding forestry education?*
Most experts initially had problems in responding to these questions. Mentioned social demands included:

- comprehensive natural resource management including:
    - a) ecologically and economically sustainable management (e.g., multiple-use forestry, biodiversity, information technology);
    - b) socially sustainable management (e.g., rural development, securing of livelihoods, urban forestry, tourism, ethical responsibility).

- prevention of calamities threatening forests;
- greater involvement in international political processes concerning forests;
- improvement of soft skills (e.g., presentation, language and communication skills).

At the same time, another image problem of forestry emerged in connection with societal demands, namely that forestry professionals have not been sufficiently able to cash in on their expertise in sustainable management in the political and public spheres. A need was seen to increase public awareness and participation in a discussion that concerned a natural resource that is seen as a public good, while at the same time, to a large extent, being privately owned.

Question 21: What is the biggest challenge for forestry education in Europe until the year 2010?
Response about the biggest challenge centered on the Bologna Process. The construction of a coherent two cycle system with "marketing of the new degrees and graduates to employers" was seen as an imperative and the inclusion of students in all processes, enhancing their approval of the changes, was seen as a crucial element here. The creation of so-called "equivalence lists for the comparison of study achievements" was mentioned as another important future challenge. Also lifelong learning/continuing education and joint degrees were seen as future tasks with growing importance. Further, it was recognized that universities needed to work on a new self-understanding leading to a clear profiling of degrees. In this context, the "need to develop or retain a research level that justifies forestry education at a university" was seen as a cornerstone.

Concerning the image problem and social relevance of forestry programs, it was seen as crucial to:

> "demonstrate that the forestry labor market still exists, to convince people that they need also traditional wood production-oriented forestry just because of all the good quality goods which are needed, to demonstrate that it is really the final or the ultimate mission of forestry to increase the welfare of people and to integrate new disciplines… to make use of existing synergies through new combinations".

The ultimate goal would thus be:

> "to make forestry in Europe more compatible with the needs of people and society, since those functions for the common good that forests have cannot simply be ignored and will gain in importance in the future".

3.2 Faculty questionnaire

During 2004, all eight forestry faculties returned the questionnaire and the sheet for statistical information sent out in June 2004. Afterwards, it took several months to complete missing information (mainly statistical), most of which was received by January 2005.

3.2.1 Administrational matters

In 2004, five faculties reported a decreasing teaching budget (GOT, MUN, HEL, WAG and VIE), two a stable budget (DRE and FRE), and one an increasing budget (JOE) during the five previous years. The percentage decreases in the budget ranged from 5% to 19%. JOE reported a budget increase of about 20%. Many faculties experienced organizational changes between 1990 and 2004. At HEL, several departments were merged in 1993 to form the departments of forest resource management, forest ecology and forest economics. In 2000, Wageningen Agricultural University was renamed Wageningen University and has become part of the Wageningen University and Research Centre. At FRE, the Forestry Faculty was merged with the Faculty of Earth Sciences to form the new Faculty of Forest and Environmental Sciences. In 1999, the Forestry Faculty in Munich was transferred from the Ludwig-Maximilian-University to the Munich University of Technology; in 2000 the faculty was broken up and – as a study faculty – integrated into the newly founded Center of Food, Landuse and Environmental Sciences in Weihenstephan. At DRE, the Faculty of Forest, Geo and Hydro Sciences was set up in 1993. GOT, VIE and JOE did not report changes.

Only the Finnish universities reported recent introductions of new professorships. DRE terminated one professorship and merged two others (**Table 5**).

3.2.2 Curriculum information

Most forestry faculties have reformed existing study and degree programs and/or introduced new degree programs in the 1990s independently of the Bologna Process, thus the efforts were not co-ordinated at the national or international level. In 2004, all surveyed faculties offered at least one MSc degree in forestry (**Table 6**). Some of the MSc degrees were freestanding with no equivalent BSc degree (e.g. the MSc *Tropical Forestry* at DRE, the MSc *European Forestry* at JOE, or the MSc in *Sustainable Forestry and Land Use Management* at FRE), but most BSc-MSc degree programs offered were consecutive.

Table 5. New or terminated forestry chairs between 1990 and 2004.

University	New chair (year of introduction)	Terminated chair (year of termination)
DRE	Forest Policy & Resource Economy (merger of Forest Policy and Forest Business Economics in 2004)	Wood Chemistry & Eco-Toxicology (2003)
HEL	Geoinformatics (2002), Economics of Private Forestry (2004), Logistics (2005)	
JOE	Wood Science (1995), Forest Ecology (1997), Wood Technology (1998), Technology of Silviculture (1999), International Forestry (2003), Forest Information Systems (2005)	

Table 6. Forestry degrees offered at the surveyed universities and their year of introduction. English degree programs are marked in bold; *BSc degree at the time of the survey optional for students.

	BSc	MSc	Diploma
DRE	Forest Sciences (1999)	Forest Sciences (1999), **Tropical Forestry** (1993), Wood Technology & Marketing (2004)	Forest Sciences (1811), Environmental Protection & Landscape Management (1993)
FRE	Forestry & Environment (2005)	Sustainable Forestry & Land Use Management (1998), **Environmental Governance (2005)**, **Forest Ecology & Management (2005)**, Forest Sciences (planned for 2008)	Forest Science
GOT	Forest Sciences & Forest Ecology (1999)	**Tropical & International Forestry**; Forest Management; Nature Protection & Forest Ecology; Wood Biology & Wood Technology; Forest Ecosystem Analysis & Information Management (all in 1999)	-
HEL	Agriculture & Forestry (1994)*	Forest Economics & Marketing (1994), Forest Ecology & Forest Resource Management (1994)	-
JOE	Agriculture & Forestry (1995)*	Agriculture & Forestry (1982), **European Forestry** (2000)	-
MUN	Forest Science (2000)	Forest Sciences & Wood Technology (2000), **Sustainable Resource Management (2001)**	Forest Science (2000)
VIE	Forest Science, Wood & Fiber Technology, Management of Environment & Bio Resources (all in 2004)	**Mountain Forestry (2002), Mountain Risk Engineering**, Forest Sciences, Wildlife Ecology & Wildlife Management, Wood Technology & Management, Management of Environment & Bio Resources, Phytomedicine (all in 2004)	-
WAG	Forest & Nature Conservation (2000)	**Forest & Nature Conservation (2002)**	-

In 1995 (officially in 1998), the profile of forestry studies at WAG was broadened to forestry and nature conservation. In 2000, the BSc degree in *Forest and Nature Conservation* was introduced, and in 2002 the faculty officially changed to BSc and MSc degrees. From 1998 to 2001, an MSc in *Tropical Forestry* existed, which was merged in

2002 with the new MSc in *Forest and Nature Conservation*. VIE reformed the Diploma in 2000 and introduced BSc and MSc degrees in 2003.

GOT approved study guidelines for the BSc and MSc degrees only in 2002, but they were already introduced in 1997. FRE reformed the Diploma several times since 1995, and in 1998 the MSc in *Sustainable Forestry and Land Use Management* was introduced. MUN reformed the Diploma in 2000 and at the same time introduced new BSc and MSc degrees with course content identical to the Diploma (the so-called Munich Model 2006); in addition, the *MSc* in *Sustainable Resource Management* was introduced in 2001. At DRE the Diploma was reformed in 1991, and between 1993 and 1999 five new BSc and MSc degrees were introduced.

Several BSc and MSc degrees offered in 2004 were considered to be test versions used during a transitional phase, and there were plans to change them to more standardized versions matching the Bologna guidelines. In 2004, three German faculties still offered enrollment in Diploma degrees, but they all planned to phase out the Diploma. HEL, JOE, WAG, VIE and GOT expected the degrees offered in 2004 to exist on a long-term basis. FRE planned to introduce new study/degree programs in 2005. MUN discontinued the Diploma and reformed the existing BSc in 2004, but continued with the existing MSc degrees. DRE planned to allow enrollment in diploma degrees until 2005.

In 2004, four faculties reported that they used only the European Credit Transfer System ECTS (MUN, DRE, GOT, VIE), whereas three (HEL, JOE, FRE) still worked with other systems and a transfer factor. WAG fully implemented ECTS in 2004, but the national system was still in use. Necessary credit units for the different degrees varied from 210 to 300 ECTS for the Diploma, from 180 to 203 ECTS for the BSc, and from 60 to 120 ECTS for the MSc (**Table 7**).

The lower amount of credits for the Diploma at FRE was caused by the fact that until 2004 no credit points were awarded for the final exam and thesis. In 2004, most faculties offered consecutive BSc/MSc degrees with the possibility of a BSc awarded after completion of 180 ECTS. The MSc was awarded after the completion of 240/300 ECTS.

Table 7. ECTS credit points needed for a forestry degree in 2004 (* degree did not exist in 2004).

Faculty	Diploma: ECTS (ECTS/year)	BSc: ECTS (ECTS/year)	MSc: ECTS (ECTS/year)
DRE	270 (60)	180 (60)	100 (32)
FRE	210 (60)	180 (60)	90 (60)
GOT	-*	180 (60)	120 (60)
HEL	-*	180 (60)	60 (60)
JOE	-*	180 (60)	60 (60)
VIE	300 (60)	180 (60)	120 (60)
MUN	284 (63)	203 (67.6)	90 (60)
WAG	-*	180 (60)	120 (60)

Three universities (JOE, WAG, DRE) gave out diploma supplements (Europass 2008) "designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended", and two were planning to do so in the future (MUN and FRE). GOT stated that the supplement was not needed for BSc and MSc degrees while HEL and VIE did not respond to the question.

Apart from one faculty (DRE), all faculties had had a degree program evaluation in 2004, or before. The evaluation had either been conducted internally (VIE), or externally either by an international panel (HEL: Lavander and Mikkola 2003), by the Interdisciplinary Centre for Research and Development in Higher Education of the University of Bielefeld (FRE), or the Finnish Ministry of Education (JOE). A few universities had had some (FRE, MUN: ACQUIN 2006) or all (WAG) forestry courses evaluated by accreditation agencies.

HEL, JOE, WAG, GOT and DRE responded in 2004 that they believed that the acceptance of the BSc degree on the national labor market was low, while FRE, MUN and VIE estimated that the level of acceptance was medium. Six faculties estimated that the acceptance level of the MSc degree was high, and two (JOE, MUN) estimated it to be medium. In 2004, few forestry students – if any – left the faculties with a BSc; only two faculties (JOE and MUN) estimated that 2-5% of students left with an undergraduate degree; however, it remained unclear, whether the students changed degrees or universities, sought employment, or went abroad. All faculties expected most students to continue to graduate level. German faculties mentioned that access to graduate studies could in the future become limited meaning that in the future 30-50% of students might have to leave the faculty with a BSc.

3.2.3   Student statistics

Enrollment varied and it proved difficult to obtain harmonized statistical data for all eight faculties (**Table 8**). At several faculties enrollment in the 1990s was comparatively low, with a recovery in the early years of the new millennium. Student drop-out rates had been asked for, but only two faculties (DRE and JOE) submitted systematically collected data, so the data will not be presented here. The other faculties commented that drop-out was difficult to monitor, since students often stopped taking credits for some time without explanation. In most cases, both the number of female students and foreigners have increased during the observation period (**Table 9**, Schuck and Pelkonen 2006).

Table 8. Student enrollment and graduate numbers at European forestry faculties. Data covers the period from fall term 1990 to fall term 2004 if not indicated otherwise ([a] 1994-2004, [b] 1994-2003, [c] 1994, [d] 2003, [e] only forest economics, cf. Table 6, [f] 1990-2002). N.A. = not available.

Faculty	DRE	FRE	GOT	HEL	JOE	MUN	VIE	WAG
Enrollment (total)	2107	1820	1882	820[b]	748	1295	2186	938
Enrollment (1990)	88	114	131	79[c]	29	101	228	39
Enrollment (1996)	75	83	118	78	51	33	112	47
Enrollment (2004)	164	114	221	95[d]	79	130	111	78
Graduates (total)	1064	840[a]	1600	261[e]	486	832	794[f]	N.A.

Table 9. Percentage of female and foreign students at the beginning and end of the survey period. Some faculties did not provide data for the respective years, so the closest year is displayed ([a] 2003, [b] 1994, [c] 2003, [d] 1999, [e] 2000, [f] 2002).

Faculty	DRE	FRE	GOT	HEL	JOE	MUN	VIE	WAG
Female % (1990)	20	26	15	53	34	33[d]	16	18
Female % (2004)	53	25	41	45[a]	37	40	22	37
Foreigners % (1990)	7	3	8	9[b]	0	8[e]	6	8
Foreigners % (2004)	13	22	10	6[c]	38	31	29	39[f]

3.2.4 Profiling during curriculum reform

The questionnaire asked about the importance of a defined faculty profile in relation to several factors during curriculum reform (**Tables 10 and 11**). Several experts marked all profiling aims as equally important.

Profiling in relation to other universities in the same country and in Europe was judged important. For three German universities and WAG, profiling with regard to the polytechnics or universities of applied science was judged extremely important.

Concerning the importance of various demands during curriculum reform, labor market demands as well as student demands were judged most important. The term societal demands obviously caused some confusion as is shown by comments such as "what is meant by this?" or "what would those be?" Lifelong learning was commented on as being a future concern.

3.2.5   Student selection and tutoring

Until 2004, only the Finnish faculties had a selection process for students at the undergraduate level with obligatory entrance exams. Until 1996, German forestry students had been selected by a central German institution (ZVS 2006) and distributed to the four faculties. The procedure (mainly based on high-school grade point averages) was phased out due to a decreasing number of applicants. In 2004, two of the German universities (FRE, DRE) reintroduced selection procedures at the undergraduate level as a result of increased enrollment. Most faculties did select students entering at the graduate level from other disciplines or universities while the transition of own students from undergraduate to graduate level was continuous, automatic and unrestricted.

Table 10. Ranking of importance of a faculty profile in relation to other institutions providing forestry education (frequencies) at surveyed forestry faculties. *WAG and VIE are the only forestry faculties in their respective countries providing forestry education.

Importance of faculty profile in relation to…	Extremely important	Important	Not important
other forestry faculties (same country)	0	5	3*
other forestry faculties (Europe)	0	5	3
universities of applied science	4	4	0

Table 11. Perceived importance of various demands during curriculum reform at surveyed forestry faculties. N.A. = not answered. The numbers represent frequencies of response.

Importance of …	Extremely important	Important	Not important	N.A.
labor market demands	3	5	0	0
societal demands	0	6	0	2
lifelong learning demands	0	6	2	0
Students' demands	2	6	0	0
foreign students	1	7	0	0

FRE, MUN and VIE offered student tutoring during the first few weeks of studies, JOE during the first year and two universities (DRE, HEL) continued tutoring throughout the whole study period. WAG and GOT did not offer tutoring. GOT mentioned that an existing tutoring program had been abandoned due to weak student acceptance. Three universities (WAG, GOT, FRE) mentioned (additional) mentoring by faculty staff.

3.2.6 *Student evaluation of teaching and the use of information and communication technology*

All universities allowed students to evaluate teaching in certain, mostly yearly, time intervals. Faculties made evaluation results available for students and lecturers (HEL, JOE, WAG, VIE, GOT, MUN) or the procedures depended on the course (FRE, DRE). Most faculties offered optional internal and/or external pedagogical courses for teaching staff. At WAG, the responsible professor decides on obligatory courses for staff members. If a position contains more than 10% teaching, the employee has to obtain an education certificate with the educational support group. JOE had an internal strategy and obligatory teaching seminars, published a "Teachers' Guidebook", and encouraged participation in voluntary training courses. Two faculties (GOT, DRE) did not offer specific courses or programs to support and improve the pedagogical competences of lecturers and teachers.

The forestry faculties reported varying importance of and quality of experience with information and communication technology (ICT). GOT and HEL replied that ICT was extremely important for teaching purposes at the faculty and JOE, FRE, WAG and VIE ranked it important, whereas DRE considered ICT as not (yet) being important. MUN did not respond to the question. GOT, FRE and JOE replied that the experiences with ICT as a teaching tool had been very positive, whereas the other faculties stated that their experiences had been neutral.

3.2.7 *Interdisciplinary, national and international co-operation*

When asked about continuous, long-term co-operation in teaching activities with other disciplines (**Table 12**), seven faculties mentioned close co-operation with geography departments, six co-operated with biology departments, five with soil science, five with law, and five with computer science departments.

Four faculties cooperated with economics, four with agricultural, three with chemistry, two with philosophy, two with languages, two with landscape architecture, and two with hydrology departments.

Table 12. Continuous and long-term teaching co-operation with other disciplines at surveyed forestry faculties faculties (x: co-operation exists, -: no co-operation).

Faculty	DRE	FRE	GOT	HEL	JOE	MUN	VIE	WAG
Geography	x	x	x	x	x	x	-	x
Biology	-	x	x	x	x	x	-	x
Soil science	-	x	-	x	-	x	x	x
Legal science	x	-	x	-	x	x	-	x
Computer science	-	-	x	x	x	x	-	x
Agric. science	-	-	x	-	-	x	x	x
Economics	-	-	-	x	x	x	-	x
Chemistry	-	x	x	-	-	x	-	
Philosophy	-	-	-	-	x	-	-	x
Languages	x	-	-	-	x	-	-	-
Hydrology	x	x	-	-	-	-	-	-

With each of the following, one faculty mentioned close co-operation: landscape architecture, political science, education, sociology, statistics, physics, mechanical/process engineering, tourism, history of art, constructional engineering and measurement technology.

Faculties were further asked to map their teaching co-operation with other universities and institutions, as well as at least five most important European universities they exchange lecturers and students with (**Table 13**).

Faculties were asked to supply generic and subject-specific competence profiles separately for each degree. Although all eight faculties offered more than one degree, most answered cumulatively for all of them.

3.2.8   Competence profile

Generic competence

Faculties were asked to create a profile of the importance of different generic competences for the forestry degrees they offer. The five generic competences judged to be most important were *capacity for analysis and synthesis, problem solving, capacity to learn, research competences,* and *ability to work in an interdisciplinary team* (**Table 14**). The mean value of the ranks given by faculties is only used to allow an overall ranking of competences. The mean is (due to the qualitative nature of the data) not the most appropriate measure of central tendency, thus – even though faculties ranked competences using numbers, these values are not given in the table –the more appropriate median and its deviation thereof are displayed instead.

Most generic competences were ranked as being of considerable or strong importance, with only a few being considered of lesser importance. Faculties gave high importance rankings to capacity for analysis and synthesis, problem solving, capacity to learn, research skills, the ability to work in an interdisciplinary team and the ability to work autonomously, while they ranked the importance of ethical commitment, planning and time management, knowledge of a second language, the appreciation of diversity and multiculturality, the understanding of cultures and customs of other countries, and initiative and entrepreneurial spirit at low levels.

Subject-specific competence

Subject-specific competences transferred by education should be clearly defined to match the title of the degree. Nevertheless, also here most faculties responded cumulatively for all degrees (**Table 15**). Also here more than half of the mentioned competences were ranked as being of considerable or strong importance.

Highest ranks were given to forest management, forest policy, forest ecology, forest products and processing, and the protection of forests, while agroforestry systems, farm forestry and other types of land use, illegal logging and deforestation, non-wood forest products, mountain forestry and protective forests, arboriculture, forest fire and short-rotation forestry ranked low in importance.

3.3 Future Forum questionnaire (Q2)

The results of the survey are presented separately for the topics of the importance of co-operation of forestry education with other disciplines, the importance of generic and subject-specific competences for BSc and MSc degrees in forestry and future challenges of forestry education. The survey questions (Appendix 3) were formulated in such a way as to inspire thought about the future needs and importance of the development of certain competences in graduates of university forestry education in Finland:

> "The aim of this research is to identify future contents of forestry education. Please evaluate – according to your own experience – the general and forestry-related professional skills for university graduate foresters of the year 2010".

3.3.1 Co-operation of forestry education units with other disciplines

The respondents were asked to rank the importance of co-operation of forestry education units with other disciplines. The highest ranking values were awarded to economic science, biology, computer sciences and languages, and the lowest rankings were awarded to psychology, educational science and history (**Figure 4**).

Of the respondents, 33% suggested further disciplines for co-operation (category "other"), which they considered very important (median = 4). The most frequently mentioned other areas of co-operation can be grouped as follows: *forest industry, engineering and technology* (n=19), *mathematics, statistics and physics* (n=9), *leadership, communication, social and behavioral science* (n=9), *environmental sciences and ecology* (n=7), *systematic planning, logistics and GIS* (n=6), and *economics and marketing* (n=4).

Table 13. Teaching co-operation, lecturer and student exchange with other universities or institutions of surveyed forestry faculties. N.A. = not answered. ISO country codes: http://www.iso.org/iso/country_codes/iso_3166_code_lists/english_country_names_and_code_elements.htm, retrieved 20.05.2008.

	Co-operation with universities	Co-operation with other institutions	Lecturer exchange	Student exchange
DRE	Swedish University of Agricultural Sciences/SE	Forest Research Institute of Saxony/DE	N.A.	BE; BG; CZ; LT; SE; SI; SK; UK
FRE	DRE, International PhD program "Forestry in Transition"/DE; MSc European Forestry/FI; Nancy/FR, Dublin/IE; Aberdeen/UK	University of Applied Forestry Rottenburg, Forest Research Institutes of Baden Wurttemberg and Rhineland-Palatinate/DE	At the time of the survey no information available	At the time of the survey no information available
GOT	FRE, MUN, DRE/DE; Euroforester MSc program/SE	University of Applied Science and Arts Holzminden/Hildesheim, Forest Research Institute of Lower Saxony/DE	Thessaloniki/GR; Prague/CZ; Brasov/RO; Zvolen/SK; Bangor/UK	Prague/CZ; HEL/FI; Brasov/RO; Alnarp/SE; Ljubljana/SI
HEL	JOE, Helsinki University of Technology, GIS Virtual University, Graduate School of Forest Science/FI	European Forest Institute; Geodetic Institute, Finnish Forest Research Institute, National Board of Forestry, Forestry Development Centre, National Land Survey, Environment Institute/FI	Prague/CZ; Tarto/EE; Ås/NO; Umeå/SE	VIE/AT; GOT, FRE/DE; Leuven, WAG/NL, Uppsala/SE; Bangor, Aberdeen/UK
JOE	SILVA network; HEL, MSc European Forestry, Graduate School of Forest Sciences/FI; Petrozavodsk State University, St. Petersburg Forest Technical Academy/RU, Umeå/SE	North-Karelia Polytechnics, Finnish Forest Research Institute, Valtimo Forest Machine School/FI	VIE/AT; Lleida/ES; St. Petersburg, Petrozavodsk/RU; Bangor/UK	WAG/NL; FRE/DE; Prague, Brno/CZ; Bangor/UK; Umeå/SE
MUN	N.A.	University of Applied Sciences Weihenstephan, Bavarian Federal Institute for Forestry, Forest Research Institute of Rhineland-Palatinate, Centre for Environmental Research Leipzig, National Research Centre for Environment and Health/DE	VIE/AT; Zurich/CH; Madrid/ES; JOE/FI; Padua/IT; Oxford/UK; Umeå/SE	VIE/AT, Zurich/CH, Madrid/ES, Dublin/IE, Padua/IT; JOE/FI; Nancy/FR; Umeå/SE; Oxford, Bogor/UK
VIE	Sopron University of West Hungary/HU	Austrian Federal Office and Research Centre for Forests/AT	N.A.	WAG/NL; Uppsala/SE; Bangor/UK
WAG	MSc European Forestry/FI, Euroleague for Life Science (ELLS), Larenstein University of Professional Education/NL	N.A.	N.A.	GOT, FRE/DE; Lleida, Madrid/ES; JOE/FI

Table 14. Ranking of importance of transferred generic competences in offered study program(s) based on the mean ($\overline{x}$) value of all surveyed faculties (**scale of importance: 1 - none, 2 - weak, 3 - considerable or 4 - strong**). Positive deviations from the median (m) are indicated with **+ (=positive)/++ (=strongly positive)**, negative deviations with **– (=negative)/-- (=strongly negative)**. Capital letters A-D indicate separate profiles for different degree programs submitted by the faculties. Helsinki: **A)** Forest Ecology and Forest Resource Management, **B)** Forest Economics and Marketing; Munich: **C)** Forestry Science MSc + Diploma, **D)** Sustainable Resource Management). Competences ranked above and below the weighted arithmetic mean (mean of means) ± 1 S.D. (3.17 ± 0.37 = 3.54) are marked in grey.

No.	Generic competence	DRE	FRE	HEL A	HEL B	JOE	MUN C	MUN D	VIE	WAG	$\overline{x}$
1	Capacity for analysis & synthesis	+	m	m	m	+	+	m	+	+	3.9
2	Problem solving	+	m	m	m	+	+	m	+	+	3.9
3	Capacity to learn	+	m	m	m	m	+	m	+	+	3.8
4	Research skills	+	m	m	m	m	+	m	m	+	3.7
5	Ability to work in an interdisciplinary team	+	m	m	-	m	+	m	+	m	3.6
6	Ability to work autonomously	+	m	m	m	m	+	-	m	+	3.6
7	Decision making	m	m	m	-	m	+	m	+	m	3.4
8	Information management skills	+	m	m	m	m	+	m	--	+	3.4
9	Basic general knowledge in field of study	++	m	m	-	m	m	-	m	m	3.3
10	Concern for quality	+	m	m	-	m	m	-	m	+	3.3
11	Will to succeed	m	m	m	m	m	m	-	m	m	3.2
12	Capacity for applying knowledge in practice	+	m	m	-	m	m	-	m	m	3.2
13	Teamwork	m	-	m	-	m	+	m	m	m	3.2
14	Ability to communicate with non-experts (in the field)	m	-	m	-	-	+	m	m	+	3.2
15	Grounding in basic knowledge of the profession	+	m	m	-	m	m	-	m	-	3.1
16	Critical and self-critical abilities	-	m	m	m	m	m	-	m	m	3.1
17	Creativity	m	m	m	m	m	m	-	--	+	3.1
18	Interpersonal skills	m	-	m	m	m	+	m	--	m	3.1
19	Elementary computing competences	m	m	m	-	m	-	-	m	m	3.0
20	Capacity to adapt to new situations	m	-	m	m	m	m	-	--	+	3.0
21	Leadership	m	m	m	-	-	m	m	m	m	3.0
22	Oral & written communication in native language	m	-	m	m	-	+	-	--	m	2.9
23	Ability to work in an international context	-	-	m	m	m	m	m	--	m	2.9
24	Project design & management	m	-	m	--	-	+	m	--	+	2.9
25	Ethical commitment	m	-	-	m	-	m	m	--	m	2.8
26	Planning & time management	m	m	-	-	-	m	-	-	m	2.8
27	Knowledge of a second language	m	--	-	m	m	-	m	--	+	2.8
28	Appreciation of diversity & multiculturality	-	-	-	-	-	m	m	--	+	2.7
29	Understanding of cultures & customs of other countries	-	--	-	m	-	m	m	--	m	2.6
30	Initiative & entrepreneurial spirit	m	m	m	--	-	m	--	--	m	2.6
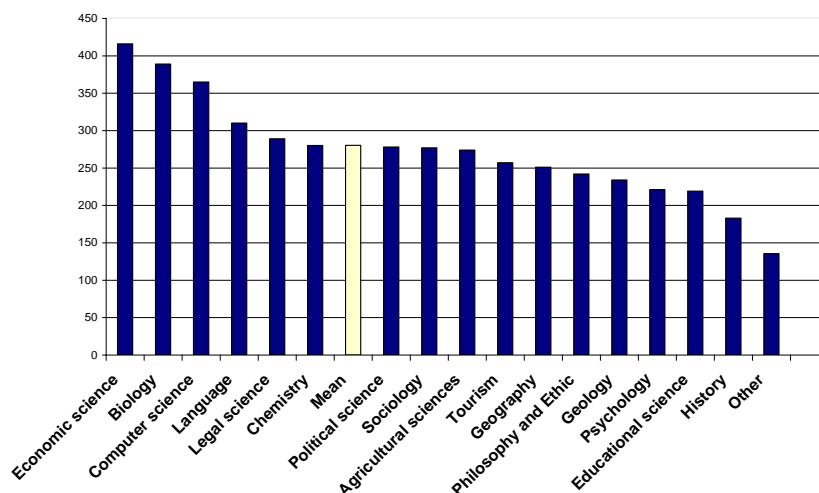
Figure 4. Q2 respondents' ranking of importance of co-operation of forestry education units with other disciplines (n=116). Presented is the sum of ranking values (scale of importance: 1 - none, 2 - weak, 3 - considerable, or 4 - strong).

3.3.2   Importance of generic competences

Many Q2 respondents commented on the difficulty to distinguish between importance of competence for the BSc and the MSc degrees, but the rankings nevertheless turned out to be significantly different (**Table 16**). The ranking showed higher mean ranking values for the MSc degree in general, but there are also other significant differences. Issues that were ranked above the mean of means +1 S.D. (3.17+0.28=3.45) for the BSc were *basic general knowledge in the field of study, capacity for applying knowledge in practice, teamwork* and *capacity to learn*; for the MSc issues that were ranked above the mean of means +1 S.D. (3.47+0.22=3.69) were *capacity for analysis and synthesis* and *information management competences.*

Capacity for applying knowledge in practice fell from second place in the BSc ranking to 22nd for the MSc and grounding in basic knowledge of profession in practice fell from 10th to 28th. At the same time, capacity for analysis and synthesis moved up from 15th for the BSc to first place for the MSc, information management skills from 9th to second, problem solving from 17th to third and ability to work autonomously from 14th to fourth. At the bottom of the scale were internationally relevant competences, but also issues such as leadership, will to succeed, concern for quality, ethical commitment and research skills. Issues that were ranked below the mean of means -1 S.D. (3.17-0.28=2.89) for the BSc were ability to work in an international context, understanding of cultures & customs of other countries, and research competences; for the MSc issues that were ranked below the mean of means -1 S.D. (3.47-0.22=3.25) were appreciation of diversity and multiculturality, ethical commitment, grounding in basic knowledge of profession in practice, will to succeed, understanding of cultures and customs of other countries, and research competences.

Table 15. Ranking of importance of transferred subject-specific competences in study program(s) based on the mean ($\overline{x}$) value of all faculties (**scale of importance: 1 - none, 2 - weak, 3 - considerable or 4 - strong**). Positive deviations from the median are indicated with **+/++**, negative deviations with **-/--**. **A)** Forest Ecology and Forest Resource Management, **B)** Forest Economics and Marketing, **C)** Forestry Science MSc & Diploma, **D)** Sustainable Resource Management. Competences ranked above and below the mean of means ± 1 S.D. (2.94 ± 0.45=3.39) are marked in grey.

No.	Subject-specific competence	DRE	FRE	GOT	HEL A	HEL B	JOE	MUN C	MUN D	VIE	WAG	$\overline{x}$
1	Forest management	+	m	+	m	++	+	m	m	m	m	3.6
2	Forest policy	+	m	+	m	++	m	m	m	m	m	3.5
3	Forest ecology	+	m	+	m	m	+	m	m		+	3.5
4	Forest products & processing	+	m	+	m	++	m	m	m		-	3.4
5	Protection of forests	+	m	+	-	m	m	m	m		+	3.4
6	Research & development	-	m	-	m	++	+	m	+	m	m	3.3
7	Information systems	m	m	+	m	++	+	-	+	--	m	3.3
8	Wildlife ecology & management	+	m	+	m	m	m	-	m	m	+	3.3
9	Mensuration & inventories	+	m	+	m	m	+	m	m	m	-	3.3
10	Timber trade	+	m	m	m	++	m	m	m	m	-	3.3
11	Soil aspects	+	m	+	m	m	+	m	-	m	-	3.2
12	Silviculture	+	m	+	m	m	+	m	-	m	-	3.2
13	Forest economics	+	m	--	m	++	m	m	m	m	m	3.2
14	Logging operations & technology	+	m	m	m	m	++	m	m	m	--	3.2
15	International forestry	+	m	+	m	+	m	m	m	--	m	3.2
16	Forest industry	m	m	m	m	++	+	m	m	m	-	3.3
17	Sociological, cultural & related economic aspects	m	-	+	m	++	m	m	m	m	m	3.3
18	Environmental & service aspects	m	m	-	m	++	+	-	+	m	m	3.3
19	Biology of forest trees	+	m	+	m	m	m	m	-	-	m	3.1
20	Sustainable land-use management	-	m	m	m	+	m	m	+	-	m	3.1
21	Biodiversity	+	m	-	m	m	+	-	m	-	+	3.1
22	Ecosystem analysis & modeling	-	-	m	m	m	+	-	+	m	+	3.1
23	Forest health	+	m	m	m	m	m	-	M	m	-	3.0
24	European forestry	+	m	-	m	+	m	m	m	--	m	3.0
25	Climate aspects	m	m	+	m	m	m	-	m	m	-	3.0
26	Modeling of forest resources	-	m	+	m	m	+	--	m	m	m	3.0
27	Community & urban forestry	-	m	--	m	+	m	-	m	-	+	2.8
28	Life-long learning & professional training	--	m	--	m	+	+	-	+	-	m	2.8
29	Tropical forestry	+	-	+	m	m	m	--	m	--	m	2.8
30	Teaching & education	--	-	--	m	++	+	-	+	-	-	2.7

Table 15. continued.

No.	Subject-specific competence	DRE	FRE	GOT	HEL A	HEL B	JOE	MUN C	MUN D	VIE	WAG	$\overline{x}$
31	Fuel and energy	-	-	-	m	m	+	--	m	m	-	2.6
32	Forest ethics	-	-	--	-	++	m	-	m	--	m	2.5
33	Forest certification	--	-	--	m	+	m	m	m	-	-	2.5
34	Genetics, breeding & biotechnology	m	-	+	-	m	-	-	-	-	-	2.5
35	Agroforestry systems, farm forestry & other types of land use	--	-	-	-	+	m	--	m	-	m	2.4
36	Illegal logging & deforestation	--	--	m	-	m	m	--	m	-	m	2.3
37	Non-wood forest products	-	-	-	-	m	m	--	m	-	-	2.3
38	Mountain forestry & protective forests	-	--	--	-	-	-	m	m	+	--	2.2
39	Arboriculture	m	-	-	-	-	-	m	m	--	--	2.2
40	Forest fire	-	--	-	-	m	-	--	m	--	-	2.0
41	Short-rotation forestry	-	--	m	-	-	-	--	m	--	--	1.8

50

Table 16. Q2 respondents' ranking of importance of generic competences in future forestry education programs on the BSc and MSc level, respectively **(scale of importance: 1 - none, 2 - weak, 3 - considerable, or 4 - strong)**. Rankings above and below the weighted arithmetic mean (mean of means) ± 1 S.D. for each degree (BSc = 2.88/3.45, MSc = 3.25/3.69) are marked in bold. Significant differences between the mean ranks of BSc and MSc rankings based on a Wilcoxon test are marked in light grey (p ≤ 0.05) and dark grey (p ≤ 0.01).

Ranking		Importance of competence in…	Mean	
BSc	MSc		BSc mean	MSc mean
1	5	basic general knowledge in field of study	3,7	3,6
2	22	capacity for applying knowledge in practice	3,6	3,4
3	17	Teamwork	3,5	3,5
4	6	capacity to learn	3,5	3,6
5	12	interpersonal skills	3,4	3,6
6	16	initiative & entrepreneurial spirit	3,4	3,5
7	18	elementary computing competences	3,4	3,5
8	7	capacity to adapt to new situations	3,4	3,6
9	**2**	information management skills	3,3	3,8
10	**28**	grounding in basic knowledge of profession in practice	3,3	3,1
11	19	planning & time management	3,3	3,5
12	10	oral & written communication in native language	3,3	3,6
13	23	concern for quality	3,3	3,4
14	4	ability to work autonomously	3,3	3,7
15	**1**	capacity for analysis & synthesis	3,2	3,8
16	8	decision-making	3,2	3,6
17	**3**	problem solving	3,2	3,7
18	9	critical & self-critical abilities	3,1	3,6
19	15	ability to communicate with non-experts (in the field)	3,1	3,5
20	11	capacity for generating new ideas (creativity)	3,1	3,6
21	14	ability to work in an interdisciplinary team	3,1	3,5
22	**27**	ethical commitment	3,0	3,1
23	25	knowledge of a foreign language	3,0	3,3
24	13	project design & management	2,9	3,5
25	20	leadership	2,9	3,5
26	**26**	appreciation of diversity & multiculturality	2,9	3,2
27	**29**	will to succeed	2,9	3,0
28	21	ability to work in an international context	2,8	3,4
29	**30**	understanding of cultures & customs of other countries	2,6	3,0
30	24	research skills	2,4	3,3

When respondents were asked to provide a **Top 5** ranking (**Table 17**), the differences in ranking became more obvious. The core of generic competences of BSc and MSc studies, as well as the highly relevant BSc and MSc competence is illustrated in **Figure 5**. According to the graphic distribution of competence rankings for the BSc and MSc degree the core generic competences for both degrees were *basic general knowledge in forestry*, *capacity to learn*, *capacity to adapt to new situations* and *information management competences*.

Table 17. Top 5 ranking of generic skills by Q2 respondents -- if a competence appeared in first place of the Top 5 ranking of a questionnaire, 5 points were awarded, for a second place 4 points were awarded and so on (Fromm 2004) and points were then added.

Top 5 ranking BSc	Rank (cf. Table 16)	Points
Capacity for applying knowledge in practice	2	158
Basic general knowledge in field of study	1	112
Interpersonal competences	5	95
Capacity to learn	4	84
Grounding in basic knowledge of profession in practice	10	79
Top 5 ranking MSc	**Rank (cf. Table 16)**	**Points**
Capacity for analysis and synthesis	1	249
Information management competences	2	122
Interpersonal competences	12	105
Problem solving	3	94
Basic general knowledge in field of study	5	90

The BSc studies should additionally emphasize capacity for applying knowledge in practice, teamwork, interpersonal competences, initiative and entrepreneurial spirit and elementary computing competences, while the MSc should then in turn emphasize oral and written communication competences in the native language, the ability to work autonomously, the capacity for analysis and synthesis, decision making, problem solving, and critical and self-critical abilities.

When comparing the views of FFF stakeholders and university experts concerning generic competences of forestry graduates, seven competences can be identified, which both groups find extremely important: capacity for analysis and synthesis, problem solving, capacity to learn, ability to work autonomously, decision making, information management skills and basic general knowledge in the field of study form the core of competence for both stakeholder groups.

FFF stakeholders put additional emphasis on the capacity to adapt to new situations, critical and self-critical abilities, and oral and written communication in native language, while university experts particularly emphasize the ability to work in an interdisciplinary team, concern for quality and research skills (**Figure 6**).

3.3.3 Importance of subject-specific competence

Also for subject-specific competences the rankings were significantly different for the BSc and MSc degree (**Table 18**). The ranking contains three competences that were not represented in the university expert ranking, namely forest law, biometry, and remote sensing.
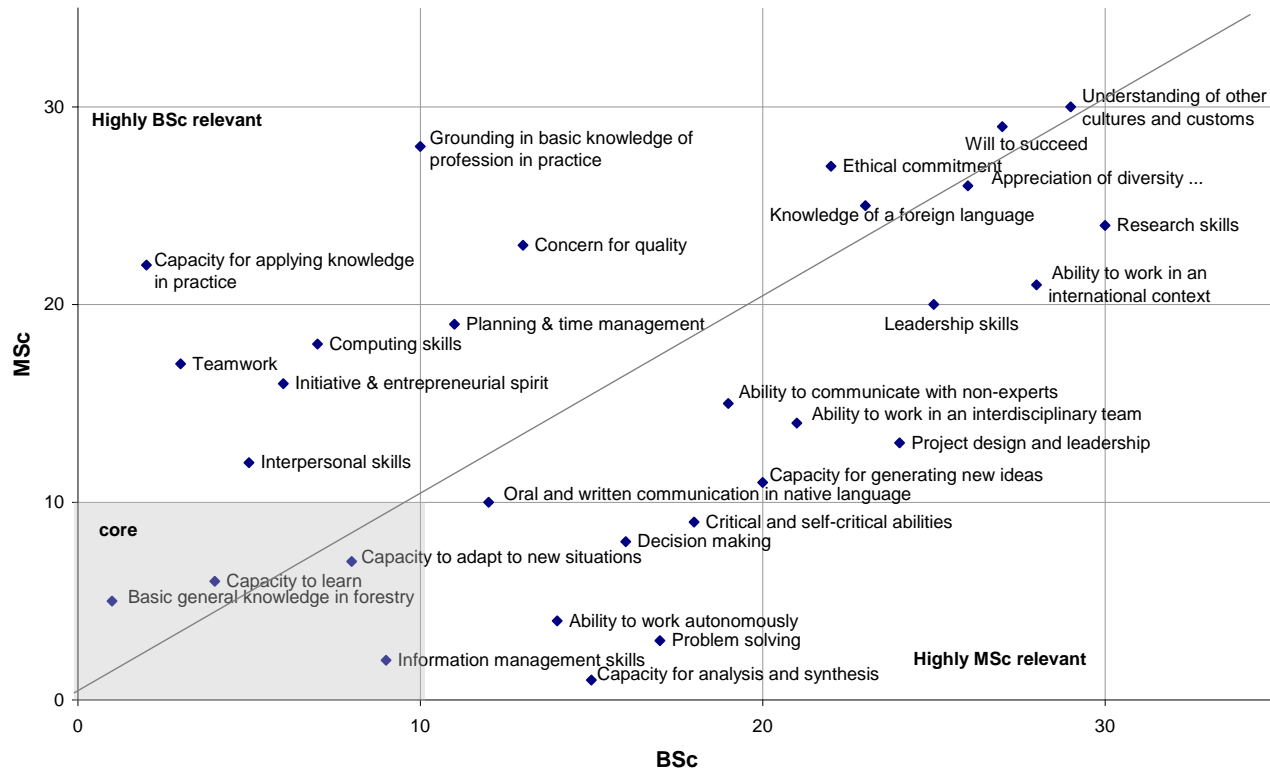
Figure 5. Q2 respondents' ranking (c.f. Table 16) of generic competences at BSc level (abscissa) as opposed to MSc level (ordinate). The core that should be particularly emphasized at both levels is constituted by a ranking in the top third marked by lines at value 10. The diagonal line visualizes the difference in ranking for the two degree levels (ranking above the diagonal: higher importance for the BSc, ranking below the diagonal: higher importance for the MSc, ranking at the diagonal: equal importance for both degrees).

Again, respondents gave in general higher ranking values for the MSc than for the BSc degree. Issues that were ranked above the mean of means +1 S.D. (2.68+0.41=3.09) for the BSc were *silviculture, forest management planning, logging operations and technology, information systems, data management and services, biodiversity, fuel and energy, forest ecology*, and *mensuration and inventories*; for the MSc issues that were ranked above the mean of means +1 S.D. (2.88+0.42=3.3) were *forest economics, research and development, information systems, data management and services, forest industry*, and *forest ecology*. Issues that were ranked below the mean of means -1 S.D. (2.68-0.41=2.27) for the BSc were *short rotation forestry, illegal logging and deforestation, agroforestry systems, farm forestry and other types of land use, forest fire, tropical forestry, arboriculture,* and *mountain forestry and protective forests*; for the MSc issues that were ranked below the mean of means -1 S.D. (2.88-0.42=2.46) were *tropical forestry, agroforestry systems, farm forestry and other types of land use*, *wildlife ecology and management, community and urban forestry, short rotation forestry, mountain forestry and protective forests, forest fire,* and *arboriculture*.

However, the importance of many traditional aspects related to forestry (e.g., *silviculture*; *forest management planning*; *logging operations and technology*; *mensuration and inventories*; *timber trade*) did not increase between degree cycles. On the other hand many peripheral issues were ranked significantly higher in importance for the MSc degree (e.g.*, research and development: methods and technology*; *information systems, data management and services*; *fuel and energy*; *forestry ethics and ethical codes of conduct in forestry*). **Figure 6** shows the core of generic competences of BSc and MSc studies, as well as the highly relevant BSc and MSc competence. According to the graphic distribution of competence rankings for the BSc and MSc degree (**Figure 7**) the core subject-specific competences for both degrees were *silviculture, forest management planning, logging operations, information systems, biodiversity, fuel and energy, forest ecology, industry, economics, law* and *products* as well as *lifelong learning competences*. The BSc studies should additionally emphasize *mensuration and inventories* and *timber trade*, while the MSc should then in turn emphasize *research and development*, *European* and *international forestry* and *forest policy* knowledge.
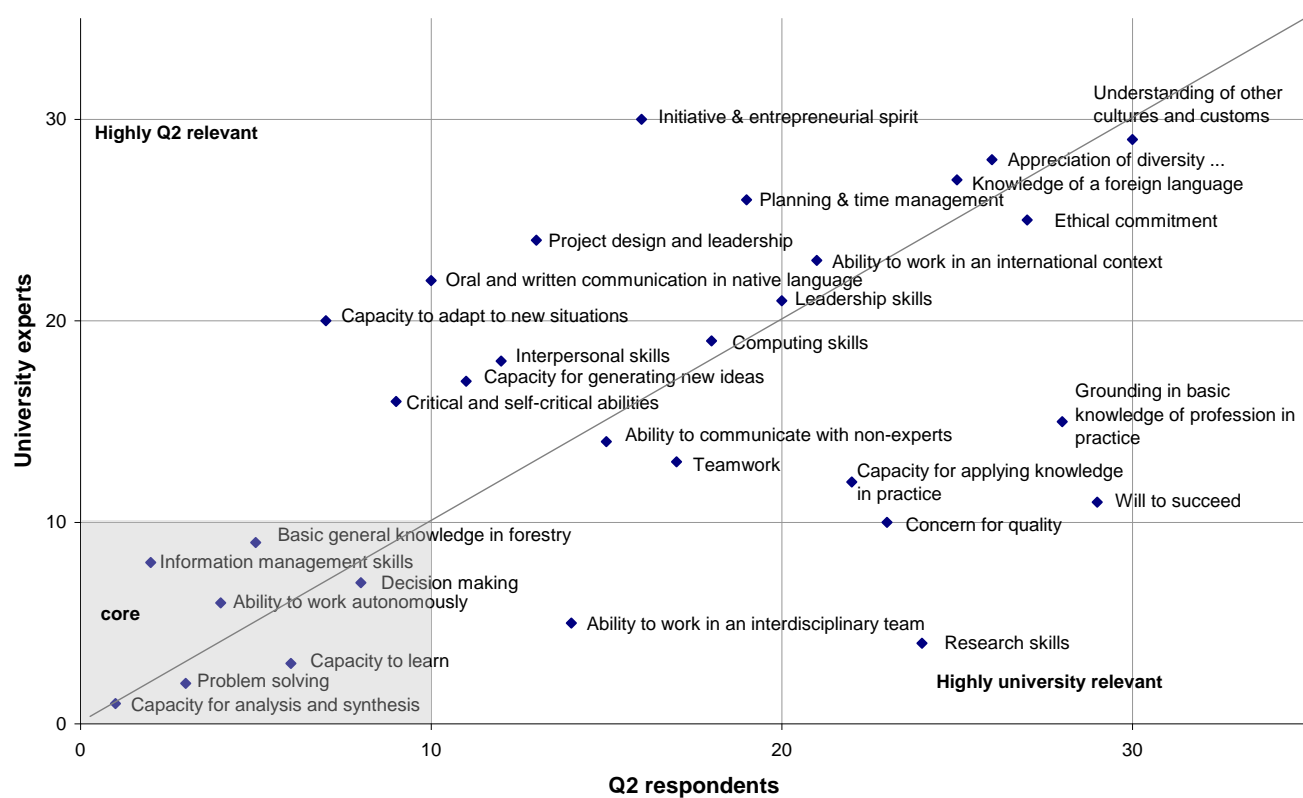
Figure 6. Q2 respondents' ranking of generic competence at MSc level (abscissa, c.f. Table 16) as opposed to university experts' (ordinate, c.f. Table 14). The core that should be particularly emphasized at both levels is constituted by a ranking in the top third marked by lines at value 10. The diagonal line visualizes the difference in ranking for the two degree levels (ranking below the diagonal: higher importance for university experts, ranking above the diagonal: higher importance for Q2 respondents).

Table 18. Q2 respondents' ranking of importance of subject-specific competences of future forestry university graduates for BSc and MSc level, respectively **(scale of importance: 1 - none, 2 - weak, 3 - considerable, or 4 - strong)**. Rankings above and below the weighted arithmetic mean (mean of means) ± 1 S.D. for each degree (BSc=2.27/3.09, MSc=2.46/3.30) are marked in bold. Significant differences between mean BSc and MSc rankings based on a Wilcoxon test are marked in light grey (p ≤ 0.05) and dark grey (p ≤ 0.01).

Ranking		Importance of…	Mean	
BSc	MSc		BSc	MSc
1	**7**	Silviculture	3.5	3.3
2	15	Forest management planning	3.3	3.2
3	10	Logging operations & technology	3.3	3.2
4	**3**	Information systems	3.2	3.4
5	**8**	Biodiversity	3.2	3.3
6	9	Fuel and energy	3.2	3.3
7	**5**	Forest ecology	3.2	3.3
8	20	Mensuration & inventories	3.1	3.0
9	**4**	Forest industry	3.1	3.3
10	**1**	Forest economics	3.1	3.6
11	13	Lifelong learning & professional training	3.0	3.2
12	12	Forest law	3.0	3.2
13	19	Timber trade	3.0	3.0
14	**6**	Forest products & processing	2.9	3.3
15	17	Sustainable land-use management	2.9	3.1
16	18	Environmental & service aspects	2.8	3.1
17	23	Forest certification	2.8	2.9
18	31	Forest health	2.8	2.8
19	21	Protection of forests	2.8	3.0
20	28	Biology of forest trees	2.8	2.8
21	27	Forest ethics	2.7	2.8
22	29	Remote sensing	2.7	2.8
23	**2**	Research & development	2.7	3.4
24	33	Soil aspects	2.7	2.7
25	14	European forestry	2.6	3.2
26	22	Teaching & education	2.6	2.9
27	16	International forestry	2.5	3.2
28	11	Forest policy	2.5	3.2
29	24	Sociological, cultural & related economic aspects	2.5	2.9
30	25	Climate aspects	2.5	2.8
31	32	Genetics, breeding & biotechnology	2.5	2.7
32	26	Modeling of forest resources	2.4	2.8
33	35	Non-wood forest products	2.4	2.6
34	**39**	Wildlife ecology & management	2.4	2.3
35	30	Biometry	2.3	2.8
36	**40**	Community & urban forestry	2.3	2.3
37	34	Ecosystem analysis & modeling	2.3	2.7
38	**41**	Short-rotation forestry	2.2	2.2
39	36	Illegal logging & deforestation	2.2	2.5
40	**38**	Agroforestry systems, farm forestry & other land use types	2.2	2.3
41	**43**	Forest fire	2.1	2.0
42	**37**	Tropical forestry	2.0	2.4
43	**44**	Arboriculture	1.9	1.7
44	**42**	Mountain forestry & protective forests	1.1	2.1

Figure 8 relates opinions of FFF seminar participants (Q2 resondents) to university experts'. Also here a common core of important competences can be found, as well as issues of particular stakeholder and university relevance.

3.3.4 *Future challenges for forestry education until the year 2010*

The final survey question asked for an opinion on the greatest challenge for forestry education at university level until the year 2010. The most prominent challenges perceived centered on education itself, namely a sensible broadening of forestry education (n=20), a competitive "brand" image to attract a sensible number of suitable students (n=8), and quality assurance in education (n=6). Frequently, the need for a clear profiling of the BSc (n=11), and in this respect also the distinction between university and polytechnic studies was mentioned (n=7). Furthermore, globalization was seen (n=10) as a future challenge.

3.3.5 *Relationship between social background information and rankings*

Importance of generic competences

Few significant differences in the ranking results of generic competences between groups were found (**Table 19**). Only "project design and management" at BSc level was considered significantly more important by women than by men. Respondents with other education than forestry considered "grounding in basic knowledge of the profession" significantly more important than respondents with forestry education at both degree levels, while individuals with forestry education found "leadership" competence significantly more important at both degree levels. Respondents employed in the forestry sector found "oral and written communication in native language" at BSc level and "capacity for applying knowledge in practice" at MSc level significantly more important than respondents employed outside the sector.

3.4   Students' questionnaire

The students' questionnaire was sent out in May and November of 2005 to the faculty e-mail lists in Joensuu and Helsinki, and thereafter three reminders were sent, before the surveys were closed two weeks later.

3.4.1   *Students' background information*

As mentioned earlier in this thesis, the results of the questionnaire have only indicative significance due to the rather low response rate. Clearly, for some reason there appeared to be limitations to motivation of Finnish students to reply to English questionnaires. Of the 117 Helsinki and Joensuu respondents, 49% were women and 51% were men; only one student belonged to the age group 18-19, 55% were 20-24 years old, 38% 25-29 years old, and 7% older than 30 years. Seven respondents from the Finnish study programs came from abroad (two from China, one from Germany, one from Russia, one from Spain, one from Latvia and one from Belgium), while 110 had Finnish nationality.

Table 19. Differences in ranking of importance of generic competences between groups at BSc and MSc level, respectively, observed using the Mann Whitney U test, n.s.= not significant. Groups: male/female, foredu/non-foredu = forestry education/other education, non-forjob/non-forjob = employment in forest sector/employment outside forest sector.

		BSc (mean rank)			Master (mean rank)	
male/female	*p*	*male*	*female*	*p*	*male*	*female*
Project design & management	0.026	50.11	64.48	n.s.		
foredu/non-foredu	*p*	*foredu*	*non-foredu*	*p*	*foredu*	*non-foredu*
Grounding in basic knowledge of profession in practice	0.004	46.71	63.73	0.021	51.25	65.42
Problem solving	0.015	56.94	42.95	n.s.		
Leadership	0.007	57.63	41.45	0.014	60.45	45.91
Oral & written communication in native language	n.s.			0.018	60.10	46.72
forjob/non-forjob	*p*	*forjob*	*non-forjob*	*p*	*forjob*	*non-forjob*
Oral & written communication in native language	0.046	49.26	36.13	n.s.		
Capacity for applying knowledge in practice	n.s.			0.030	53.02	38.18

For 110 students, forestry was their first degree, while for seven it was the second. The biggest group of respondents had started their studies in the year 2004 (19%), while 14% each had started in the years 2003, 2002, 2001, and the years before 2000. In 2000, 13% of the respondents had started their forestry studies, and 12% had started in 2005 or later. Some 67% of the JOE and HEL students grew up in an area with more than 5.000 inhabitants, while 33% grew up in an area of less than 5000 inhabitants. Of the MSc EF respondents, 47% were women and 53% were men; 20% were 20-24 years old, 56% 25-29 years old and 24% older than 30 years. Most (91%) of the MSc EF students had started their MSc studies in 2004 or 2005. Some 32% of the respondents came from European Union countries, while 68% came from other parts of the world. Some 73% of the students grew up in an area with more than 5.000 inhabitants, while 29% grew up in an area of less than 5000 inhabitants. For the rankings, the opinions of Finnish students are displayed separately as well as pooled, since they study in the same national system and aim at the same national labor market. MSc EF students are displayed separately.

Importance of subject-specific competences
A consistent pattern of significant differences in ranking between groups was found for subject-specific competences. Results pointed into the same direction and depended on social background information of the respondents. Nevertheless, the consistency of the results shows the relevance (**Table 20**).
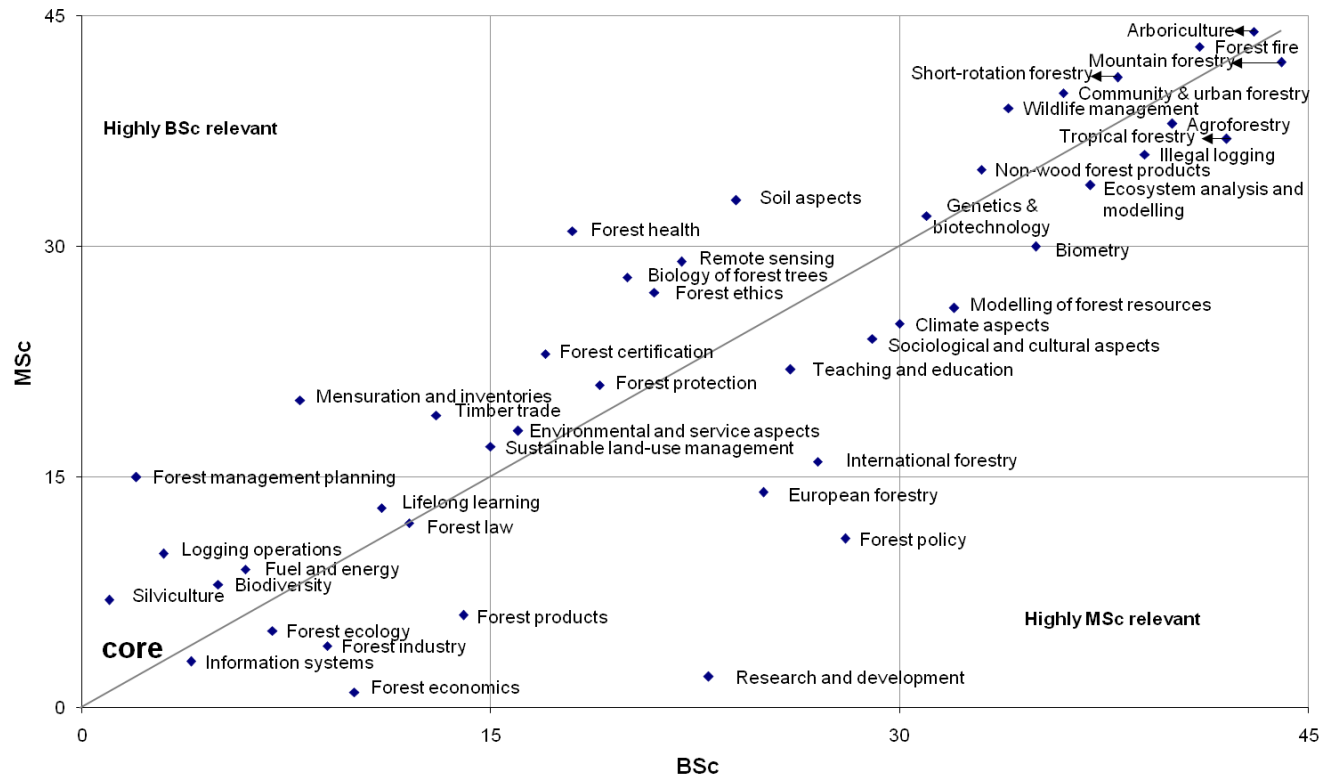
Figure 7. Q2 respondents' ranking (c.f. Table 18) of subject-specific competence at BSc level (abscissa) as opposed to ranking at MSc level (ordinate). The core that should be particularly emphasized at both degree levels is constituted by the competence ranking in the top third of competence at both degree levels marked by lines at value 15. The diagonal line visualizes the difference in ranking for the degree levels (ranking below the diagonal: higher importance for the MSc, ranking above the diagonal: higher importance for the BSc, ranking at the diagonal: equal importance for both degrees).
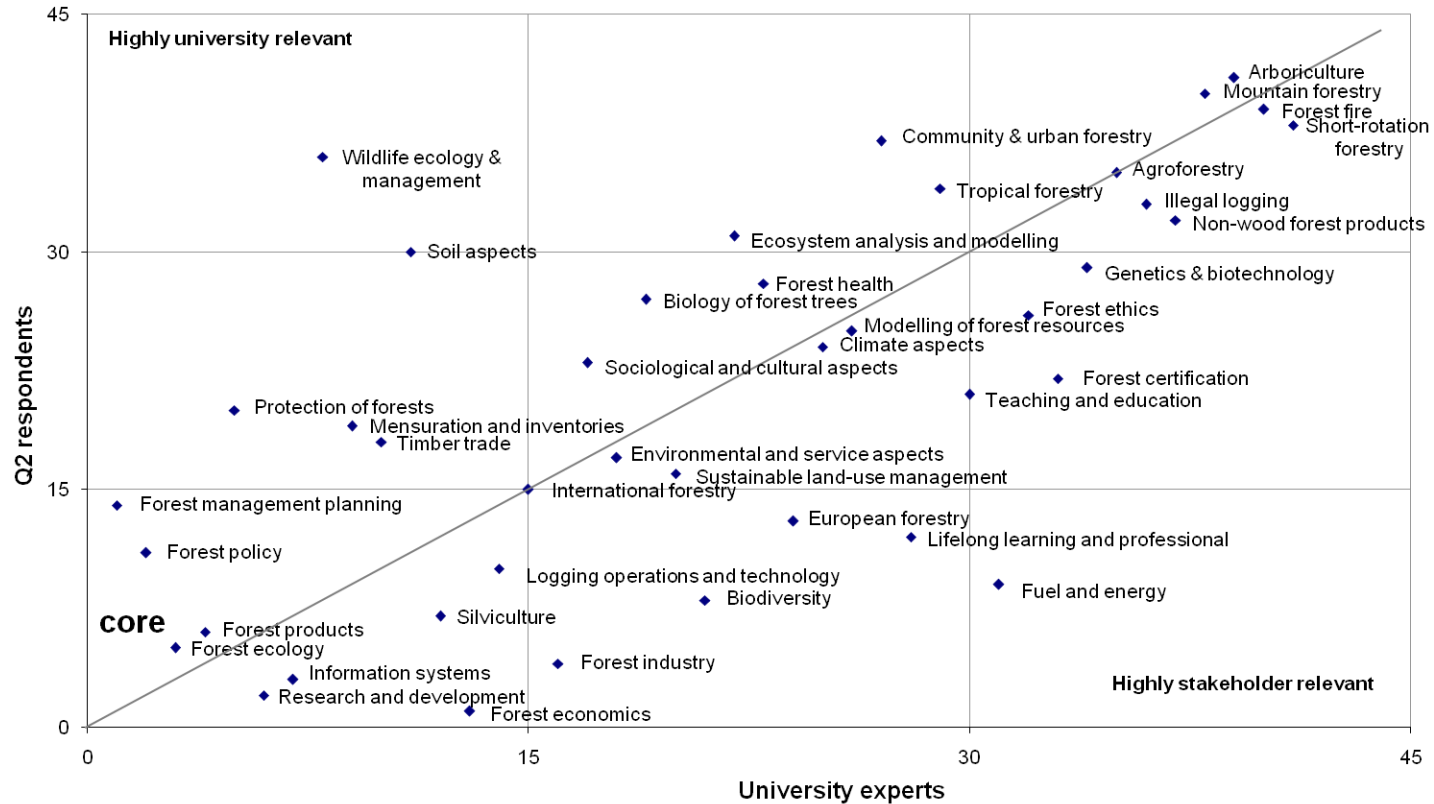
Figure 8. Q2 respondents' ranking of subject-specific competence at MSc level (c.f. Table 18) compared to ranking of university experts' (c.f. Table 15). A ranking in the top third for both groups marked by lines at value 15 constitutes the core competences.

Results show that only "information systems, data management and services" at MSc level was ranked as more important by respondents with forestry education than by respondents with other education. At the same time, respondents who have other than forestry education, who work outside of forestry employment, or who were women, consistently and significantly considered many subject-specific competences at both degree levels more important than the group of men or those with forestry education or employment. The largest number of significant differences was found for respondents without forestry employment, who ranked the importance of 21 (20) issues significantly higher at BSc (MSc) level, than respondents with forestry employment.

3.4.2   Students' motivation

When asked to state the main reason why they had decided to study forestry in one sentence, the answers (N=145) of the students can be grouped as follows:

I started to study forestry, because
- of interest in environment/nature/biology/ecology/forestry (n=71)
- of multidisciplinarity/interdisciplinarity (forests and economy: n=17, science and practice: n=2, other combination: n=11, *total n=30*)
- of good job opportunities/salary (n=12)
- of family reasons (farm: n=2, forest enterprise: n=1, forest owner: n=5, *total n=8*)
- of international employment opportunities (n=7)
- I got in/got a scholarship (n=9)
- of importance of forests in Finland (n=4)
- of importance of forests for human society (n=1)
- to upgrade a polytechnic degree (n=3)

Forestry was the first choice for 66% of the Finnish, and 61% of the MSc EF students. If forestry had not been the first choice, the first choices had been, most frequently biology/environmental sciences (n=13), economics (n=8), or medicine (n=5).

3.4.3   Students' satisfaction

The students were asked for their general satisfaction with their forestry studies and for the satisfaction with the personal support (tutors, mentors) provided by the faculty (**Table 21**).
Most students mentioned that they were satisfied or extremely satisfied (76%) with their forestry studies while 10% were disappointed. Fewer students (58%) were satisfied or extremely satisfied with personal support provided by the faculty, and the percentage of disappointed students rose to 19%. In both categories students from Joensuu were on average (forestry and personnel support) less satisfied than students from HEL or from the MSc EF program.

Table 21. Student satisfaction with forestry studies and personal support (frequency values and percentages).

Satisfaction level (with forestry)	HEL (%) n=77	JOE (%) n=40	MSc EF (%) n=34	Total (%) N=151
Extremely satisfied	5 (6.5)	4 (10.0)	5 (14.7)	14 (9.3)
Satisfied	58 (75.3)	21 (52.5)	22 (64.7)	101 (66.9)
Undecided	10 (13.0)	6 (15.0)	5 (14.7)	21 (13.9)
Disappointed	4 (5.2)	9 (22.5)	2 (5.9)	15 (9.9)
Satisfaction level (with personal support)	HEL (%) n=77	JOE (%) n=40	MSc EF (%)	Total (%) N=151
Extremely satisfied	5 (6.5)	4 (10.0)	4 (11.8)	13 (8.6)
Satisfied	41 (53.2)	14 (35.0)	20 (58.8)	75 (49.7)
Undecided	16 (20.8)	12 (30.0)	6 (17.6)	34 (22.5)
Disappointed	15 (19.5)	10 (25.0)	4 (11.8)	29 (19.2)

Furthermore, students were asked to mention why they were disappointed. Respondents could check all the options that they found appropriate, but each option could only be checked once (**Table 22**).

Table 22. Causes for student disappointment (frequency values and percentages).

I am disappointed because…	HEL (%) n=65	JOE (%) n=34	MSc EF (%) n=11	Total (%) n=110
chances to find a job are bad	36 (55.4)	23 (67.6)	2 (18.2)	61 (55.5)
teaching quality is not as good as I expected	25 (38.5)	22 (64.7)	5 (45.5)	52 (47.3)
there is no systematic progress in teaching	23 (35.4)	12 (35.3)	3 (27.3)	38 (34.6)
I cannot see that the skills I learn will be useful for me in the future	15 (23.1)	13 (38.2)	4 (36.4)	32 (29.1)
students are not supported properly by the faculty	16 (24.6)	8 (23.5)	4 (36.4)	28 (25.5)
studies are not challenging & rather too simple	10 (15.4)	9 (26.5)	5 (45.5)	24 (21.8)
the faculty does not take students seriously	9 (13.8)	8 (23.5)	1 (9.1)	18 (16.4)
I do not really seem to fit into the student group	7 (10.8)	4 (11.8)	1 (9.1)	12 (10.1)
the content of the courses is not interesting	4 (6.2)	3 (8.8)	4 (36.4)	11 (10.0)
the university environment does not seem right for me	6 (9.2)	2 (5.9)	0 (0)	8 (7.3)
the studies are more difficult & time consuming than I imagined	4 (6.2)	3 (8.8)	0 (0)	7 (6.4)

Table 20. Significant differences in ranking of importance of subject-specific competences between groups at BSc and MSc level, respectively, observed using the Mann Whitney U test, n.s.= not significant. Groups: male/female, foredu/non-foredu = forestry education/other education, non-forjob/non-forjob = employment in forest sector/employment outside forest sector.

		BSc (mean rank)			MSc (mean rank)	
male/female	*p*	*male*	*female*	*p*	*male*	*female*
Mensuration & inventories	0.038	47.08	60.20	n.s.	-	-
Agroforestry systems, farm forestry & other forms of land use	0.018	46.14	61.09	n.s.	-	-
Climate aspects	0.031	46.83	60.48	0.008	49.80	67.80
Forest fire	n.s.	-	-	0.043	51.68	63.38
Biodiversity	0.000	44.77	69.67	0.001	49.57	70.04
Sustainable land-use management	0.000	43.90	70.15	0.000	47.75	73.48
Short rotation forestry	0.006	45.04	62.50	n.s.	-	-
Illegal logging & deforestation	0.015	45.99	61.64	0.011	49.90	66.77
Forest certification	n.s.	-	-	0.045	51.31	64.56
Environmental & service aspects	n.s.	-	-	0.016	50.16	65.96
Community & urban forestry	0.009	46.27	63.07	0.003	49.45	68.92
Sociological, cultural & related economic aspects	n.s.			0.014	50.06	66.27
Lifelong learning & professional training	0.013	43.32	62.15	0.047	50.81	63.92
Forestry ethics	n.s.	-	-	0.044	50.78	64.02
foredu/non-foredu	*p*	*foredu*	*non-foredu*	*p*	*foredu*	*non-foredu*
Modeling of forest resources	0.003	43.33	59.88	0.004	47.86	64.72
Forest ecology	n.s.	-	-	0.012	48.58	63.09
Biology of forest trees	0.041	44.92	56.38	n.s.	-	-
Ecosystem analysis & modeling	0.003	43.11	60.35	0.037	49.21	61.66
Agroforestry systems, farm forestry & other forms of land use	0.000	40.01	63.48	0.001	47.07	66.53
Genetics, breeding & biotechnology	0.020	44.09	56.90	0.005	47.79	64.88
Climate aspects	0.012	44.48	58.61	0.004	47.78	64.91
Forest fire	0.050	46.11	56.82	n.s.	-	-
Sustainable land-use management	n.s.	-	-	0.004	47.67	65.16
Short-rotation forestry	0.000	41.62	61.82	0.006	47.42	63.92
Mountain forestry	n.s.	-	-	0.004	48.24	65.66
Arboriculture	0.001	42.39	61.95	0.008	48.29	63.73
Forest certification	n.s.	-	-	0.020	49.26	63.31
Community & urban forestry	0.010	44.48	59.10	0.002	47.51	66.11
Information systems	n.s.	-	-	0.016	57.70	43.78

Table 20. continued.

forjob/non-forjob	p	BSc (mean rank) forjob	non-forjob	p	MSc (mean rank) forjob	non-forjob
Modeling of forest resources	0.001	39.72	61.40	0.004	44.62	64.69
Forest law	0.035	42.03	56.50	0.000	44.13	70.38
Ecosystem analysis & modeling	0.004	40.30	58.63	n.s.	-	-
Agroforestry systems, farm forestry & other forms of land use	0.011	40.61	57.20	0.015	45.19	61.88
Biology of trees	0.000	39.22	63.77	0.041	45.69	59.41
Genetics, breeding & biotechnology	n.s.	-	-	0.010	44.69	63.00
Climate aspects	n.s.	-	-	0.033	45.42	60.75
Soil aspects	0.026	41.54	55.80	n.s.	-	-
Forest fire	0.000	40.29	65.00	0.009	45.71	62.44
Wildlife ecology	0.007	40.50	57.70	0.001	44.43	65.63
Short-rotation forestry	0.001	39.10	61.20	0.015	44.65	61.38
Tropical forestry	0.047	41.74	54.83	0.044	46.10	60.50
European forestry	n.s.	-	-	0.014	45.66	62.72
Mountain forestry	0.031	41.60	55.53	0.000	44.35	69.25
Protection of forests	0.039	41.65	55.27	0.018	45.32	61.22
Arboriculture	0.0001	39.84	60.83	0.003	44.59	64.81
Forest products & processing	0.012	41.43	58.31	0.023	45.75	61.29
Logging operations & technology	0.040	42.14	56.00	n.s.	-	-
Illegal logging & deforestation	0.001	39.67	61.63	0.002	44.34	66.09
Forest certification	0.015	41.66	58.30	0.000	44.25	69.75
Environmental & service aspects	0.003	40.15	59.37	0.027	45.37	61.00
Community & urban forestry	0.001	40.33	61.63	0.001	44.06	67.47
Research & development	0.021	41.46	56.20	n.s.	-	-
Forestry ethics	0.007	40.89	58.93	0.013	44.99	62.84

Of the respondents, 12 (16%) students from HEL and 6 (15%) of the students from JOE did not check any cause for disappointment, while the percentage was 68% of the MSc EF students. On average, students from HEL checked 2.4 different causes for disappointment, students from JOE 3.1, and students from the MSc EF 2.2.

The most serious disappointment was bad chances on the labor market, followed by disappointment in teaching quality. Students do not experience studies as being too difficult or uninteresting, but rather as too simple and lacking systematic progress. When asked if they had considered stopping studying forestry, the majority (53%) replied *no never*, 41% replied *yes sometimes,* and 6% of the respondents replied *yes quite often*. Frequently mentioned alternatives to studying forestry were: marketing/business economics (n=19), a job of some kind (n=7), teacher's education (n=6), engineering/technology (n=6), environmental policy/economics/law, biology (n=5 each), mathematics/physics, languages/literature, something more practical/polytechnic studies (n=4 each).

3.4.4   Opinions on the Bologna Process and the Bachelor degree

Of the respondents, 70% had heard about the Bologna Process, 20% had not, and 10% were not sure. When asked about the importance of harmonization of degrees on a European level, 20% found harmonization extremely important, 65% found it important, 9% found it not important and 6% were undecided. The majority of respondents (74%) had not considered leaving university with a Bachelor degree (BSc), while 5% have seriously considered it; 15% said that they would consider leaving with a BSc if they would be offered a job, and 6% were undecided.

Students were invited to give comments concerning the Bologna Process and the BSc degree. There were few and rather negative comments on the Bologna Process from Finnish students, e.g.:

"The Bologna Process sucks in its outcome. We had this really good way of measuring work in weeks in Finland. Now there is some stupid 27,xx h/credit measurement, it makes no sense. And the only reason is that some influential person has decided that a degree is 300 credits and 5 years. Also the system seems to be pretty inflexible".

"The process itself is a good idea, but the pace has been too fast, too many difficulties in organizing new curriculums and too much administrative work for departments without help from the upper organization".

Positive comments were made only by foreign students. Transparency and harmonization were much appreciated because they facilitate mobility:

"It is a very productive goal to make degrees transparent, increase mobility between universities and to improve education quality".

"It is an important initiative … There should also be full financial support to the students coming from developing countries and other types of assistance (free accommodation ...) to students from developed countries".

"The Bologna Process is a very good option because it will increase the number of exchange programs and international students".

Table 23. Students' opinions concerning the BSc (in %).

The BSc…	HEL %	JOE %	MScEF %	Average %
will help students to change universities/ study fields more easily	60	58	65	61
makes mobility within Europe easier	65	60	50	58
is not yet well accepted by employers	61	68	21	50
increases competition between university and polytechnic graduates	31	40	26	32
shortens study times	29	13	29	24

Clearly students saw positive aspects of the BSc. At the same time they were convinced that it will help students to move horizontally within the University sector but not that it would help to find a job or help the vertical movement between polytechnics and universities.

Respondents made additional comments concerning the BSc, which were of qualitative interest if more comments were made pointing in the same argumentative direction. Thus, examples of the issues that were mentioned more frequently were grouped and will be presented (see Appendix 5).

3.4.5   Importance of generic competence

Students were further asked to rank the importance of generic competences in the courses they have taken so far (**Table 24**). The response was not divided into BSc and MSc level studies, since the Finnish students study in a consecutive BSc/MSc program.

Surprisingly, there was a rather good consensus between students from HEL and JOE on which competences are most (and least) emphasized in forestry studies, even though respondents study at different universities. The students in the MSc EF program study in a very different MSc program, so consensus could not be expected and was also not found in the results.

Respondents were also asked to rank the importance of expertise in the respective generic competences in finding a job as a graduate (**Table 25**). The respondents could check as many competences as they wanted. On average, respondents from HEL chose 9.2 competences, those from Joe 10.7 competences, and MSc EF students chose 12.9 competences.

Also here there was a rather good consensus between students from HEL and JOE on which competences are most (and least) important to find a job later. Naturally, the students in the MSc EF program found other competences relevant, since they do not aim as much at the national labor market in Finland as the Finnish students. The importance of basic general knowledge in forestry dropped from first place in importance in forestry studies to mid-field in importance to find a job, while the importance of problem solving and decision-making increased. The importance of knowing a foreign language was ranked quite high in both rankings, while intercultural knowledge and other implications of international co-operation were ranked low.

Table 24. Students' ranking of generic competence (**scale of importance: 1 - none, 2 - weak, 3 - considerable or 4 - strong**): "If you **think about all the courses you have taken so far** in your forestry studies, which importance do the **courses** give to the improvement of the following competences?" The table gives the *mean value* for each student group, but the ranking is based on the mean of the pooled students from JOE and HEL (*joint mean*). Competences that deviate more than the mean of means ± 1 S.D. for each group (HEL=2.70 ± 0.34=3.04, JOE = 2.55 ± 0.35=2.90, MSc EF=3.02 ± 0.21=3.23) are marked in grey.

Importance of competence in *forestry courses*	HEL	JOE	Joint mean	MScEF
Basic general knowledge in forestry	3.43	3.33	3.34	3.00
Ability to work autonomously	3.20	3.23	3.16	3.09
Computing skills	3.11	2.92	2.98	2.94
Grounding in basic knowledge of forestry	3.07	2.88	2.98	2.88
Knowledge of a foreign language	3.08	2.95	2.96	3.29
Capacity to learn	2.92	2.87	2.91	2.88
Capacity for analysis and synthesis	2.97	2.78	2.84	3.09
Problem solving	3.00	2.73	2.82	3.00
Information management skills	2.75	2.83	2.80	2.94
Research skills	2.97	2.70	2.77	2.94
Teamwork	3.08	2.63	2.75	3.21
Capacity to adapt to new situations	2.67	2.65	2.62	3.41
Oral and written communication in native language	2.60	2.63	2.58	2.38
Capacity for applying knowledge in practice	2.74	2.43	2.57	3.12
Planning and time management	2.51	2.62	2.57	3.00
Appreciation of diversity and multiculturality	2.65	2.54	2.56	3.32
Decision making	2.55	2.53	2.55	2.97
Concern for quality	2.68	2.40	2.54	3.00
Ability to work in an interdisciplinary team	2.69	2.50	2.52	3.15
Critical and self-critical abilities	2.69	2.40	2.49	3.00
Ability to work in an international context	2.73	2.45	2.45	3.38
Interpersonal skills	2.79	2.33	2.38	3.12
Will to succeed	2.45	2.38	2.38	2.97
Understanding of customs and cultures of other countries	2.20	2.28	2.33	3.26
Capacity of generating new ideas	2.28	2.23	2.29	3.15
Ethical commitment	2.51	2.01	2.24	3.00
Ability to communicate with non-experts in the field	2.27	2.10	2.16	2.71
Initiative and entrepreneurial spirit	2.25	2.05	2.13	2.88
Project design and management	2.21	2.00	1.98	2.79
Leadership skills	2.05	1.93	1.89	2.79

The graphic distribution of rankings of importance of competences for the forestry studies and for the labor market (**Figure 9**) shows that for Finnish students the core generic competences for both dimensions were *basic general knowledge in forestry*, *knowledge of a foreign language*, *capacity to learn* and *problem solving*.

Table 25. Students' ranking of most important generic competences for finding a job: "Expertise in which of these competences will in your opinion be **MOST IMPORTANT** to find a job later?" Students were allowed to check as many competences as they wanted. The table displays frequencies (Σ = HEL+JOE). The top 5 and bottom 5 competences for each ranking are marked in grey.

Importance of competence in *job search*:	HEL	JOE	Σ	MSc E F
Problem solving	36	28	64	25
Teamwork	43	21	64	23
Knowledge of a foreign language	36	23	59	20
Decision making	34	24	58	22
Ability to work in an international context	28	23	51	14
Capacity to adapt to new situations	32	18	50	18
Capacity of generating new ideas	30	18	48	18
Interpersonal skills	29	18	47	13
Capacity for applying knowledge in practice	30	17	47	18
Project design and management	25	20	45	18
Capacity to learn	35	10	45	13
Ability to work in an interdisciplinary team	24	19	43	17
Will to succeed	27	16	43	13
Leadership skills	29	13	42	14
Capacity for analysis and synthesis	27	14	41	16
Planning and time management	27	13	40	22
Basic general knowledge in forestry	26	13	39	10
Information management skills	22	16	38	10
Computing skills	26	12	38	15
Written communication in native language	17	14	31	4
Ability to work autonomously	16	15	31	12
Ability to communicate with non-experts in the field	17	12	29	15
Research skills	16	12	28	18
Critical and self-critical abilities	16	9	25	11
Concern for quality	14	6	20	8
Understanding of customs and cultures of other countries	10	9	19	16
Initiative and entrepreneurial spirit	11	6	17	14
Ethical commitment	10	3	13	16
Appreciation of diversity and multiculturality	8	4	12	12
Grounding in basic knowledge of forestry	5	2	7	5

The students think that additionally to the core, the competences that will get them a job are the ability to work in an international context, the capacity to adapt to new situations and for applying knowledge in practice, decision making, interpersonal competences, the capacity for generating new ideas and project design and management.

3.4.6   *Importance of subject-specific competence*

Students were asked to rank the importance of subject specific competences in relation to what would make studies more interesting (**Table 26**) and what would give graduates better chances to find a job.

Respondents were asked for their opinion on which competences would be most important in finding a job (**Table 27**). The respondents could check as many competences as they wanted. On average, respondents from HEL chose 5.0 competences, those from Joe 5.4 competences, and MSc EF students chose 7.0 competences.

According to the graphic distribution of competence rankings for interest and labor-market relevance (**Figure 10**), the core subject specific competences for both degrees included *international forestry* and *economic knowledge*. From an interest point of view, respondents also included *sociological* and *sustainable resource management knowledge*, while from the labor-market point of view respondents thought that *information services competences* and *applied knowledge* would help graduates to find jobs.

Table 26. Students' opinion on which changes would make forestry studies more attractive. Possible answers were yes (value 1), no (value -1) or don't know (value 0), Σ = HEL+JOE.

I would like to learn more about...	HEL	JOE	Σ	MSc EF
international forestry	48	23	71	24
sociology	44	20	64	22
sustainable resource management	34	18	52	26
economic sciences	28	3	31	13
applied (practical) knowledge	9	20	29	26
ecology	5	3	8	27
research	-2	7	5	22
information services skills	8	0	8	17
educational skills	-4	-6	-10	8
technology	-12	-8	-20	1
traditional forestry	-22	-4	-26	5
biology	-33	-14	-47	8

Table 27. Students' opinion on which subject-specific competences will be MOST IMPORTANT to find a job later. Respondents could click all options they found appropriate. The table displays frequencies (Σ = HEL+JOE).

| Subject-specific competence	JOE	HEL	Σ	MSc EF
Language skills	31	55	86	26
Applied (practical) knowledge	25	49	74	28
Economic knowledge	19	48	57	21
International forestry knowledge	23	28	51	24
Computing skills	16	35	51	16
Information services skills	19	34	53	13
Sustainable resource management	13	25	38	22
Ecological knowledge	13	22	35	16
Technology forestry knowledge	11	22	33	11
Research knowledge	13	18	31	21
Sociological knowledge	11	19	30	16
Educational skills	7	15	22	10
Biological knowledge	4	8	12	8
Traditional forestry knowledge	4	7	11	6
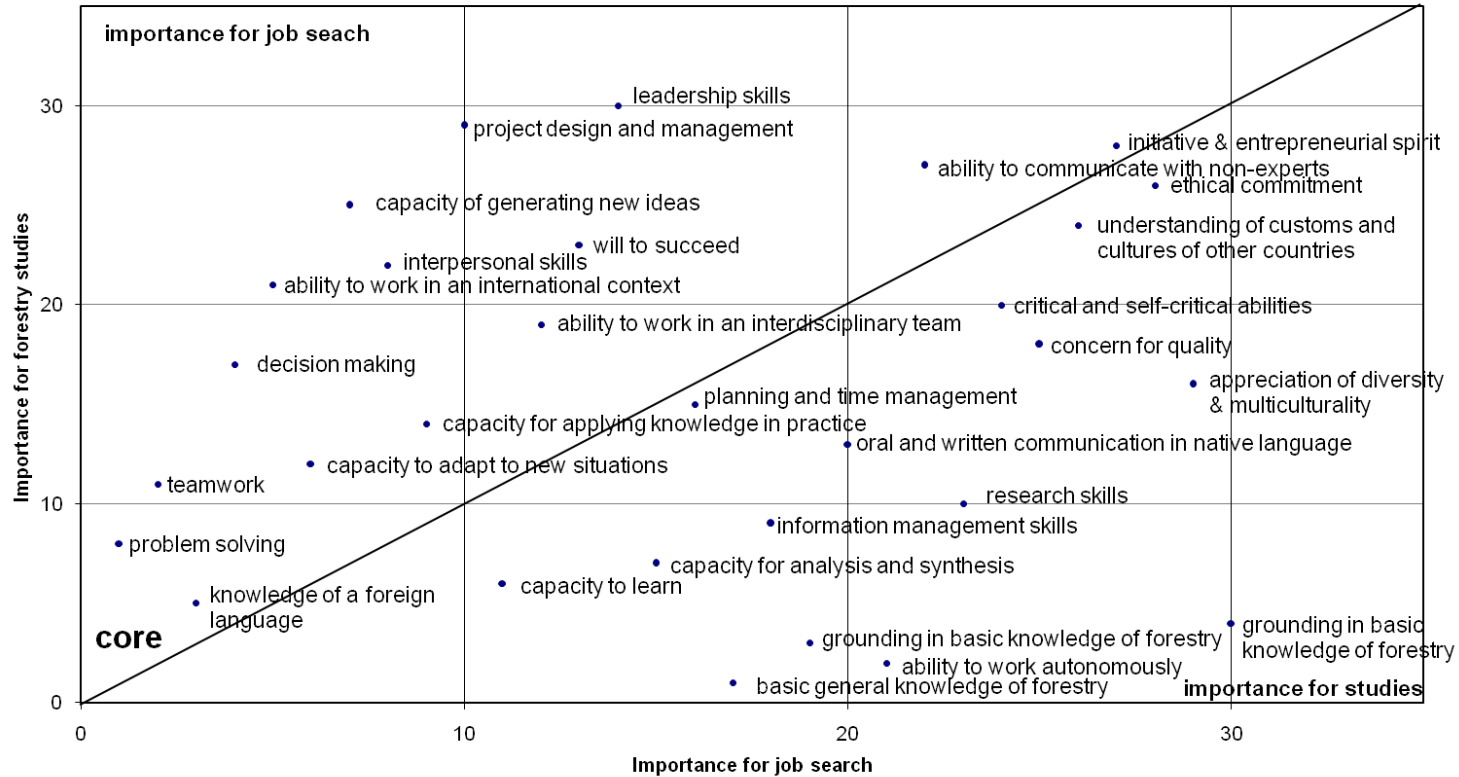
Figure 9. Students' ranking of importance of generic competences during forestry studies as opposed to competences perceived important for job search. The core is constituted by the competences ranking in the top third of competences on both levels.
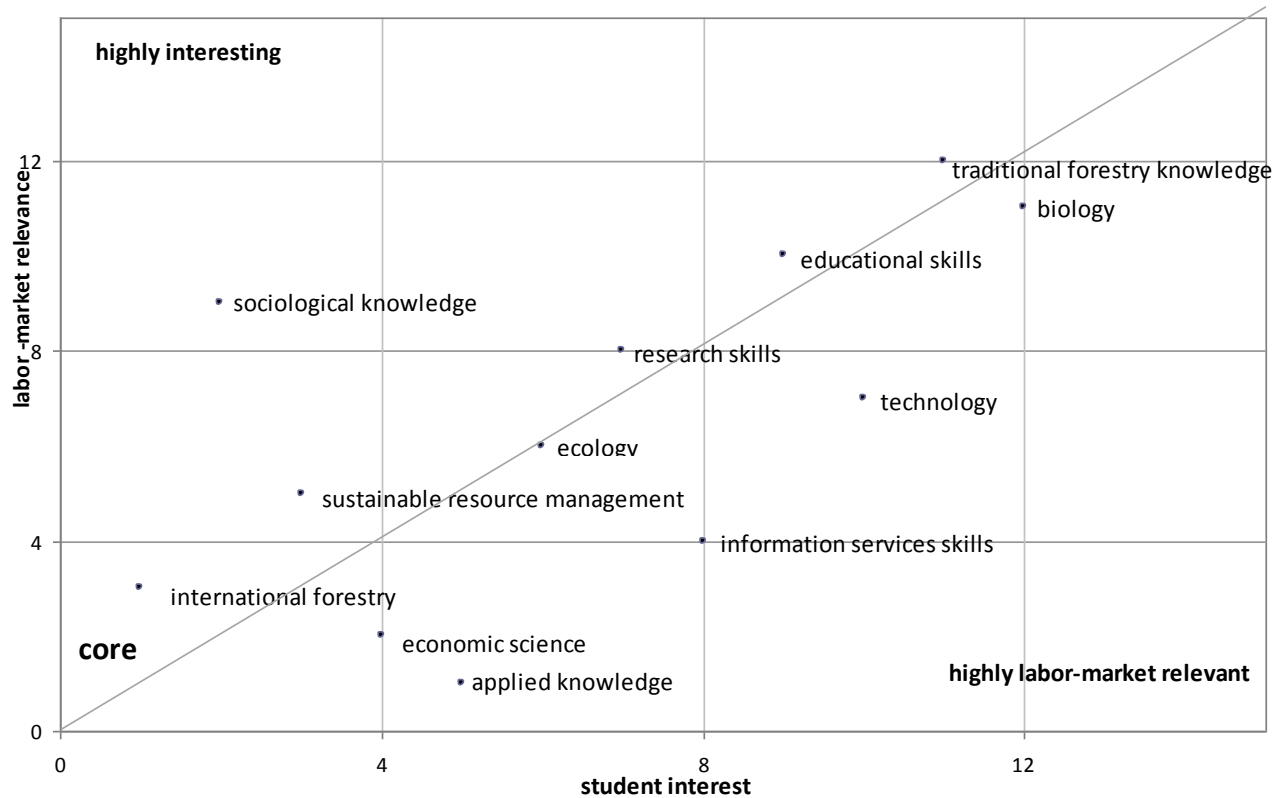
Figure 10. Ranking of interest in and labor-market relevance of subject-specific competences in forestry by Finnish forestry students. The core is constituted by the competences ranking in the top third of competence of both levels.

4 DISCUSSION

4.1 Internationalization and competitiveness

Concerning the question whether and with whom forestry faculties compete it was observed that the surveyed university faculties did not define themselves as competing with each other internationally or nationally, but there were overt and covert signs of competition with UASs/polytechnics in Finland and in Germany. Forestry faculty experts and students expressed the view of a diverging and less clear cut profile of forestry as can be seen in the changes of the faculties' names from forestry to, e.g., forest sciences, and the broad range of competences perceived as important by students as well as stakeholders. Also a change in the student pool was visible (more urban, female, and foreign students at most faculties). In this study, found weak signals (that is first signals of changes that might happen in the future, a term described, e.g., by Moijanen 2003) of all the trends in higher education were found (towards 'precarious' or 'flexible' employment, a 'mass' or 'abundance' paradigm, a 'life-long learning society', an 'international' or 'global' labor market) described by Teichler (1999b) also in higher forestry education in all European countries. This could be expected, since research in this area frequently reiterates issues of current public debate (Teichler 1999b). The observation of these signals justified our approach to embed the analysis of curriculum change in a European context of educational change.

When analyzing the results in detail, the focus lay on a number of observed "hot topics", such as the acceptance of the BSc degree in the respective countries and the following discussion on competence profiles concerning the borderline between – in particular undergraduate – university and UAS education, but also on less prominent issues, such as competence profiles and student satisfaction. During the analysis of the data a large amount of parallels in observations with other related and even unrelated disciplines of higher education was discovered. Important results will be summarized as observations after each section.

4.2 Parallels between developments in HFE and agricultural sciences

Looking at the overall situation concerning all surveyed forestry faculties, many of the observations made in this report confirm current trends and observations made in agricultural sciences (Danish Evaluation Institute 2002) and also with the Trends V report (Crosier et al. 2007). Both evaluations found that the different status of implementation and the different history of educational programs made comparisons of different countries difficult. This was also the case in HFE where during the observation period many universities still offered continuous degree programs with no formal selection procedure for the transfer to graduate level (at least for national students). This complicated the comparison of data on student enrollment. Also for HFE the history of the different degree programs further complicated comparisons as did changing names of degree programs. The Danish Evaluation Institute (2002) gave out the following recommendations to improve delivery and homogeneity of agricultural degrees, and the results of this research will be set in relation to them:

Recommendation 1 and 2: *"analyze the reasons for the decline in the number of applicants to the agricultural science program"; "analyze and keep records of the reasons for the relatively high dropout rates"*

Similar recommendations can be made concerning degree programs of forest sciences. During the survey period, none of the questioned forestry faculties had analyzed reasons for the fluctuations in application numbers and – apart from one German faculty – they did not consistently and systematically collect drop-out statistics.

Recommendation 3: *"analyze when and in which form support to students is most needed and adjust the student counseling system accordingly"*

Also among forestry faculties, there was no consistent approach to student tutoring, mentoring or counseling. One faculty mentioned that they had discontinued tutoring, since they had found that it was not accepted by the students. Serious consideration needs to be given to continuous and consistent monitoring of students' needs throughout their studies. This will be particularly important when QA will move from a teaching- to a learning-centered evaluation approach. In our study, 25% of the polled students in Finland were convinced that students are not properly supported by the faculty.

Recommendation 4 and 5: *"formulate independent educational goals for the BSc program"; specify "the desired subject-area related skills and competencies and the desired generic skills and competencies of the graduates in its program goals"*

Even though forestry faculties were asked to submit competence profiles for each degree program separately, most faculties gave the responses cumulatively for all forestry degrees (or if separately then for the different MSc programs) and BSc profiles were not submitted separately. However, well-defined competence profiles for each degree offered are needed when applying for QA evaluations.

Recommendation 6: *to analyze "the implications of not recognizing the BSc degree as an independent degree, which qualifies students for the labor market"*

The acceptance of the BSc as an independent degree qualifying for the labor market was also extremely difficult for forestry faculties in Germany and Finland, sometimes helped by the attempt to redefine "labor-market relevance" to their liking, or to ignore it altogether.

Recommendation 7: *"to ensure a high level of coordination between basic science and applied science courses and to promote integration of the different types of courses"*

The dichotomy of an either/or preference of basic science in relation to application in education proved to be another problem of HFE, especially because the application level was seen as the domain of UASs. Currently, the typical undergraduate curriculum is geared towards broad generic abilities, while the graduate degree is more domain-specific. This was also true for forestry education (Sample et al. 1999). In Europe there is a tendency to distinguish between application- and research-oriented degrees. In Germany, both profile types of degrees can be awarded by either universities or UASs (Federal Ministry 2005). At the same time, we observed a German trend to leave the more application-oriented traditional forestry profile to the UASs and to focus on research-oriented degrees.

In the Netherlands, on the other hand, close cooperation between the Wageningen University and several UASs had developed during the observation period as was also indicated by the inclusion of Van Hall Larenstein University of Professional Education into the Wageningen University and Research Centre in 2004. In Finland, no particular strategy

of dealing with the problem of degree profiling could be observed apart from defensive and protective remarks being made by all surveyed groups (experts, stakeholders <u>and</u> students). These remarks included the perceived "higher value of a university degree" in general and the view that "polytechnics (i.e. UASs) earned undeserved benefits from the BP" an indicator for an unhealthy climate for curriculum development.

Recommendation 8: *"to engage all relevant stakeholders, including students, in the preparation of the goals"*
During the survey period, the inclusion of different stakeholders and students in the preparation of the curricular goals was at a minimum level at most surveyed forestry faculties (Schuck 2006) and the procedure for the inclusion of stakeholders happened mostly sporadically at irregular time intervals without a clearly structured approach. There was a large amount of insecurity on how to establish and promote stable links to the labor market.

Further, the evaluation of agricultural science programs and the surveys described in this thesis indicate that faculties show different levels of internationalization and have also found different solutions to common problems. This suggests that it could be beneficial for faculties to co-operate and learn from good practice developed at other institutions in the same field. But at present, the established platform for this purpose, the SILVA network, is not used intensively and efficiently enough for this purpose. Summarizing the aforementioned, the following observations were made:

Observation 1: Common European educational and employment trends affect HFE.

Observation 2: There are striking parallels between the observations of deficiencies made during the implementation of changes in agricultural sciences and in HFE.

4.3 Finnish higher education in an international context

Looking at another study comparing progress made in the course of the BP – The Trends V report (Crosier et al. 2007) – Finland has been at the European forefront of implementing new degree structures according to the Bologna requirements (p. 18). However, the Trends V report clearly states that the implementation of reforms has not always followed the desired path and that structural reforms often lacked a link to strategic institutional objectives. Especially where negative attitudes towards the reforms were found, the Trends V study observed a correlation towards questioning the new student-centered learning paradigm as well as the need of institutions to re-think the institutional role in society. Looking at Finnish HFE in a European context, this study reiterates these critical remarks. One example is the difficulty of developing a free-standing BSc degree in Finland.

4.4 HFE and the new degree structure

Finnish forestry faculties have been extremely reluctant to change to the BSc and MSc degree structure as well as to ECTS and can be called late adopters of reforms in this context. Looking at the speed of the implementation of change concerning the BP, WAG, GOT and MUN have been early adopters according to the described results, while the other

faculties were rather careful to implement reforms, particularly concerning a truly discontinuous transition between the BSc and the MSc with separate admission procedures for the MSc. Additionally, there were some other striking issues concerning Finland in particular that were observed in research results of the surveys of Finnish students and stakeholders, respectively. These will also be discussed in detail.

As argued in the introduction, there are two main dimensions to competitiveness of higher education degrees: the *attractiveness* of the degree program for potential students and the *employability* (Yorke 2004) of graduates on the current labor market. An analysis of these dimensions will be given in the next sections.

4.5 Attractiveness of the degree program for potential students

Among the faculties surveyed, only Finnish universities have consistently required an obligatory entrance exam and accepted rather few students (app. one out of four applicants per study place) for HFE compared to other universities (see Schuck and Pelkonen 2006). In other countries, application numbers had been rather low since the mid 1990s, and showed considerable variation between study years. Consequently enrollment had recently been unrestricted in Germany, Austria and the Netherlands. During the period 1999-2005, the financial situation concerning teaching was only good at JOE with a rising budget, while the teaching budget decreased in HEL (as it did at all other surveyed faculties). The Finnish faculties were also the only faculties among those surveyed to introduce new professorships in HFE during the observation period. Compared to other European faculties, the Finnish forestry faculties have had constantly high percentages of female students (>30%). Since 2002, JOE has drastically increased the number of foreign students, mainly due to the MSc European Forestry program – the only forestry program in Finland taught completely in English during the survey period. Consequently, the number of courses taught in English was also increased at JOE. HEL, in contrast, continued to have rather low percentages of foreign students until the end of the survey period. However, even if the number of courses taught in English had increased, the topics of the courses were still mainly centered on topics relevant in Finland.

Both Finnish faculties were broadly cooperating with other disciplines, universities and institutions in education, and were active in student and lecturer exchange. Concerning teaching cooperation with other disciplines, the stakeholder view of importance of cooperation in Finland largely coincided with the active cooperation of both Finnish faculties in economic science, biology and computer science, while there was too much emphasis placed on geography, and not enough emphasis placed on language studies and legal science. Finnish students considered that too much emphasis in forestry courses was placed on biological aspects: the surveyed students neither wanted to learn more about biology, nor did they think it would improve their chances in the labor market. Based on the results of this study, a merger of the forestry faculty with the faculty of biology at the University of Joensuu discussed in 2006 and 2007 appears neither desirable for the faculty nor the students, since most students already think that biology is over-emphasized during the forestry studies.

Students expressed interest in a larger amount of courses dealing with international forestry, sociology and sustainable resource management, while they believed that most relevant for finding a job later would be application skills, as well as economic and

international forestry knowledge. Also language skills were considered to be extremely important by students.

Observation 3: Even though Finland was at the forefront of implementing the Bologna requirements, Finnish HFE belongs to the late adopters of change, most likely due to the constantly high student application numbers and the by comparison still rather strong economic importance of the forest sector in Finland. Also the forest sector in Finland has a better public image than in most other European countries.

Observation 4: Finnish forestry faculties cooperate with other institutions, but the cooperation did not always emphasize the aspects that students judge important for finding a job later. Biological and geographical aspects were over-emphasized in contrast to application skills, economic and international forestry knowledge, which were judged to be of greater importance.

Observation 5: The number of foreign students in Finland has increased during the observation period, but the courses offered were usually separate from those for Finnish students. Forestry students were often reluctant to enroll in courses taught in English and also Finnish students were rather reluctant to go abroad.

4.6 Structural changes in Finland

European HEIs have traditionally taught basic scientific competences (such as basic scientific skills) and foundation courses during the early years of the studies, but often very domain specific and at the cost of both application and a broader curriculum based on generic competences. So it was to be anticipated that one of the major conflicts would be related to the introduction of free-standing Bachelor degrees. It turned out that the resistance to accept the BSc as a labor-market relevant degree was extremely high among all stakeholder groups in Finland. This was the case even though in Finland students graduate comparatively late from MSc equivalent degrees and the BSc provides an opportunity to shorten this. One reason for resistance was obviously the fact that one aim of the BP is that the BSc degree awarded by universities is meant to be equivalent to a BSc awarded by a UAS.

Concerning the faculty profile in relation to the profile of UASs, Finnish faculties found it important, but not extremely important, to adjust their faculty profile. During the interviews and throughout the surveys, the image created was one of a perceived inferiority of degrees offered by UASs by all parties (experts, students and stakeholders) in Finland. As late as April 2006, attempts to officially change the English name of Finnish polytechnics to UAS failed due to pressure from the Finnish Ministry of Education and the universities followed by discussions and statements in Finnish newspapers.

Both Finnish faculties had changed to a standardized BSc/MSc structure with 180/120 ECTS respectively, increasing the attractiveness for foreign students. However, at the end of the observation period the enrollment selection for Finnish students still happened at undergraduate level only and access to the graduate level was automatic and unrestricted. Compared to other European countries, there was less concern about the public image of forestry in Finland. This has to do with a better image of forestry and the forest-based industry among the Finnish public as compared to the rest of Europe (European

Commission 2002). Thus, Finnish universities have retained the traditional degree name *BSc/MSc Agriculture and Forestry*, even though the trend outside Finland was to replace the term forestry with a broader term. For outsiders and foreigners this degree name is not transparent, since it suggests agricultural expertise of graduates – particularly questionable at JOE which does not offer in-depth agricultural studies.

Observation 6: In countries with a large number of UASs offering also forestry degrees, the change to undergraduate and graduate degrees met strong resistance. Application and/or research orientation as a focus of different educational institutions cannot easily be upheld if an independent BSc level is introduced.

Observation 7: In Finland, the acceptance of a labor-market relevant undergraduate degree was low among experts, students and stakeholders. This was the case even though there is general agreement that graduation in Finland takes too long.

4.7 Quality assurance

Both Finnish faculties offered tutoring programs and students evaluated teaching at regular intervals. The results of evaluations were made public for lecturers and students, and there were also voluntary teacher education courses for teaching staff. However, even though there were scattered efforts at evaluating quality, the efforts appeared overall neither well coordinated at all levels nor systematic. Both Finnish faculties had had an external evaluation of their degree programs, but there had not been a quality certificate awarded by an independent accreditation agency like at other surveyed faculties. Across all surveyed faculties, student participation in evaluation was sporadic and for most students limited to teaching evaluation (the least standardized and coordinated evaluation approach) and remained at a minimum level (Schuck 2006). The Trends V study (2007) observed that while students "may be involved formally in decision-making bodies, many pointed out that they are not involved in discussion to prepare key decisions, and it is at this stage that their input would be most effective". At the same time the survey emphasized that "in institutions with more experience of internal QA and in the more mature external QA systems, high levels of student involvement were taken for granted and regarded as highly beneficial by both students and institutional leaders alike". Consequently, the low participation levels of students in QA can be seen as an indicator for less experience and less mature external QA systems used by the surveyed HFE institutions.

Observation 8: Participation of students and stakeholders was at a minimum level during the implementation of changes in Europe during the observation period. There was no consistent approach of surveying the opinions of both groups concerning curriculum change.

Observation 9: Efforts towards quality assurance were made by all surveyed faculties, but there was no consistent or comparable approach used.

4.8 Graduation and employability of graduates

As mentioned earlier, Teichler (1999b) has described four major trends affecting the relationship between higher education and the world of work: (1) trends leading to short-term employment; (2) universities delivering mass education; (3) lifelong learning; and (4) internationalization. Apart from the second trend, these were also clearly visible in the results of the surveys and interviews of this research as well as in discussions in Finnish society concerning HFE. The influences of these trends on Finnish forestry were elaborated by Niskanen (2006). When asked about the employment situation within the forest sector, the interviewed experts from all European faculties mentioned that it was not particularly good, but also not extremely bad.

Looking at Finnish graduation numbers, it can be estimated that during the observation period appr. 800 students graduated from HEL and 486 from JOE (Schuck and Pelkonen 2006), thus on average approximately 85 forestry students per year graduate from both universities. Enrollment for the 15 year period can be estimated at approximately 1800 students, so that the estimated graduation percentage is quite high (~80%). However, to find employment was very difficult for young graduates, particularly for those from JOE. A report by Turunen (2002) showed that the unemployment figures were higher and that the average salary was lower for forestry graduates from JOE than for graduates from HEL, and that graduates more often than in the past ended up working in short-term employment.

A more recent survey conducted by JOE (Puhakka and Tuominen 2006) followed up on the situation of graduates from different disciplines of the years between 1999 and 2000. It showed that almost a fifth of forestry graduates had been unemployed for more than a year after graduation. Respondents mentioned the weak employment situation in the forestry field and in the region and their lack of work experience as the most important reasons. However, forestry graduates who were employed had the highest share of respondents who were of the opinion that their current job supported progress in their career. At the same time, though, few forestry graduates thought that the theoretical or practical competence of their discipline had a great importance in their current work, but placed rather greater importance on foreign language skills, leadership competence and basic entrepreneurial competence. In contrast, theoretical and practical competence in the discipline (i.e. basic general knowledge in field of study) ranked high in self-described faculty profiles, and was ranked even higher in importance as being emphasized during forestry courses by students and also by stakeholders. However, surveyed students in this study did not believe that these competences were very important in finding a job.

To ensure sustainable development of HFE, a new approach to participation can and needs to be developed. In Finland, contact information of forestry graduates is readily available, but graduate surveys have been conducted by many institutions (e.g., the faculties, the universities, the occupational service centers, the labor union, students writing a research thesis). Unfortunately, the uncoordinated approach to surveys has lead to limited response rates, and an unwillingness to respond to yet another survey. Surveys concerning forestry have to be co-ordinated to protect this valuable source of information. Also feedback the results of these surveys need to be given to participants to demonstrate the usefulness of responding to these questionnaires.

Observation 10: The employment situation within the forestry sector is difficult, also in Finland; however, graduation percentages in Finland are rather high. It is even difficult for

forestry graduates of the University of Joensuu to find a job after graduation than for graduates from the University of Helsinki.

Observation 11: Efforts to survey graduates of forestry faculties are mostly uncoordinated and sporadic. The valuable source of graduate surveys is used for questionable purposes, making it almost impossible to ensure high response rates for important surveys.

4.9 Importance of generic competences for graduates to be competitive

The most important generic competences the eight European forestry faculties (and JOE in particular) sought to emphasize in teaching were *capacity for analysis and synthesis, problem solving, capacity to learn, research competences, ability to work in an interdisciplinary team, and the ability to work autonomously*. At the same time, students perceived that the most important competences taught during their forestry studies were *basic general knowledge in the field of study, the ability to work autonomously, computing skills, grounding in basic knowledge of forestry, knowledge of a foreign language* and *the capacity to learn*. Obviously the perceptions of faculties and the students of what is being emphasized during the curriculum deviate to some extent. Nevertheless, the response of students from JOE and HEL showed considerable overlap. Only one of these competences, namely *language skills*, was ranked highly important to find a job by students, while *problem solving, teamwork* and *decision making* were thought important but underemphasized in the courses taught. This underlines that, in the opinion of the students, important competences for finding a job are underemphasized during their studies - a cause of dissatisfaction.

Looking at the competence profiles submitted by the various forestry faculties in this study, *knowledge of a foreign language* as well as *leadership skills* were ranked in the lower third and *entrepreneurial spirit* was ranked last. Concerning *leadership skills* and *entrepreneurial spirit*, this mindset was also confirmed by the judgment of students concerning the importance given to these competences in forestry-related classes they had attended. In these classes they ranked the mentioned skills as being least and second-least important. While the importance of *entrepreneurial spirit* for forestry graduates ranked quite high (rank 6) in at least the BSc ranking of stakeholders, *knowledge of a foreign language* and *leadership skills* ranked quite low in both rankings. At the same time, students ranked the importance of *knowledge of a foreign language* high both in the courses they have taken and in job search, while *leadership skills* ranked in mid-field and *entrepreneurial spirit* low in importance in job search.

This shows a clear mismatch in stakeholder perception of globalizing markets on the one hand and the importance of foreign language skills in forestry curricula on the other hand. While many acknowledge internationalization, they obviously do not see the explicit need of emphasizing intercultural knowledge and competence in university teaching itself. The program for foreign students at the University of Joensuu, for example, has been kept separate from the program for Finnish students. Thought should be given to the integration of programs to benefit cross-cultural understanding through contact between student pools. An internationalization of the study core is preferable to outsourcing of internationalization to student and lecturer mobility. At the same time, even though students consider language competence very important, there was an observable reluctance to attend courses delivered in other any than the national language at all surveyed faculties except WAG. Also our

experience with the survey of Finnish students indicated that response rates among students were low because the surveys were conducted in English. Finnish students are even reluctant to go abroad for a significant part of their studies – a fact that results in an imbalance in the numbers of incoming and outgoing students in Finland. This has already been addressed by the Finnish Ministry of Education (2005).

Concerning the future of forestry education programs, practical generic skills such as problem solving, capacity to learn, basic general knowledge in field of study and capacity for applying knowledge in practice were perceived most important for the BSc level by stakeholders, while research skills ranked in last place. Research skills, however, are given great importance by faculty. For the MSc degree, the most important skills were capacity for analysis and synthesis, information management skills and problem solving.

Observation 12: The perception of Finnish students from Helsinki and Joensuu of what is being emphasized during the forestry showed considerable overlap. In the opinion of the students, important competences for finding a job are underemphasized during their studies, a fact which causes dissatisfaction.

Observation 13: There is a mismatch between competences Finnish students think will be important for finding a job later and what interests them. Thus, even if courses/degree programs enhancing important job-relevant competences were offered, there seems to be a chance that students would not enroll in them.

4.10 Employability in the eyes of different stakeholders

Employability is a "shared responsibility, with institutions, students and employers to the fore" (Yorke 2004), but at present employers are disenchanted with a university education that is trying to stay clear of stakeholder influence and participation. Strikingly, when considering all the information from surveys and interviews, there was a strong evolving impression that presently the employers in Finland (and to some extent also in Germany) use the discussion about labor-market relevance of education and employability of graduates in favor of the UASs and against the universities. While high importance was given to interdisciplinary and international cooperation, there was overt and covert resistance against cooperation with UASs. Cooperation between institutions and stakeholders could help to close the gap. There were clear signals that employers currently "punished" the universities and their graduates for not complying with the perceived needs of labor-market relevance by preferring UAS graduates to university graduates with the argument of university education being less application oriented.

This observation fits in well with the Trends V study (Crosier 2007) which found that a clear differentiation of universities and other institutions has an important impact on employability. It states in this context that "many within universities consider it a reasonable division of labor that other institutions concentrate on professionally relevant first cycle degrees or on the question of first cycle employability". In turn, little public credit and value is given to those application skills emphasized by university education: research, analysis, synthesis, reporting and presentation. The problem was most pronounced in countries with a large number of UASs. Consequently, this has resulted in an aggressive and unhealthy attitude of the universities and also university students and graduates towards UASs in Finland and to some extent also Germany. Here UAS students and graduates are

perceived to gain unfair advantages through the introduction of the BSc-MSc system. This was enhanced by a statement issued by the Finnish Ministry of Education (2005) that "with their distinct profile, polytechnic graduates compete for the same jobs with university graduates". Ultimately, the conflict has lead to a further devaluation and under-emphasis of the importance of the BSc degree in Finland and Germany. Proactive and constructive co-operation between universities and UASs would be imperative to address and solve these problems followed by a public discussion.

Apart from this, disagreement about institutionalized competence profiles of graduates was visible in the surveys. Concerning generic skills the most striking mismatch between what the faculties emphasized and what the stakeholders ranked as important was the importance of *research skills* that was ranked low for both the BSc (rank 30) and the MSc (rank 24) level by stakeholders, while it was ranked among the top five competences in importance in the faculties' ranking. A clear distinction was made by stakeholders concerning "research" which was ranked as unimportant, as opposed to "research and development" which was ranked much higher in importance. However, there was a core of issues that were perceived as highly important by both stakeholders and European forestry faculties regardless of degree level. Overall, the stakeholder ranking of importance of skills at BSc level fit quite well with the cumulative self-evaluation of the profile of importance of generic skill by the different faculties with four of the six most important issues for faculties (c.f. Table 14) and the Top 5 ranking for the BSc level of stakeholders (c.f. Table 17) being the same. Concerning a core of generic competence for both BSc and MSc degrees, four competences were identified by Finnish stakeholders: *basic general knowledge in the field of study, capacity to learn, capacity to adapt to new situations* and *information management skills*. Five other competences where perceived as highly BSc relevant: *interpersonal skills, teamwork, elementary computing skills, initiative and entrepreneurial spirit, and capacity for applying knowledge in practice*. These BSc relevant competences could represent a sound basis for a labor-market relevant profile, particularly if *application* and *entrepreneurial spirit* are addressed properly. The MSc in turn would thus pick up the core competences and – building on this basis – add other additional MSc relevant competences. Six competences were judged to be highly MSc relevant: *oral and written communication in native language, ability to work autonomously, capacity for analysis and synthesis, decision making, problem solving*, and *critical and self-critical abilities*. Thus the MSc graduate would be an independent professional with the capacity to analyze and manage.

Looking at the subject specific competence rankings, there was a large overlap of competences that were perceived as least important by stakeholders and by forestry faculties, while there was less consensus concerning issues perceived to be of high importance by all eight surveyed faculties. However, when looking at the ranking given by Finnish faculties only, it becomes clear that particularly the forest economics and marketing degree in HEL and the forestry degree in JOE focus strongly on many of those issues perceived as important by Finnish stakeholders. Summarizing the profile, the stakeholders suggest a strong relationship of the BSc towards forest management and operational planning, while the MSc is seen as being more closely related to forest economics and industries.

Overall, Finnish stakeholder opinion suggests an application-oriented approach for the core competences concerning the BSc degree, while the MSc is seen as less application oriented, even though it is apparently also not seen as strongly research oriented. It became clear that Finnish stakeholders judge the orientation towards basic research as being

unimportant, but at the MSc level, the combination of research and development skills were perceived as the second most important competence in the ranking. However, this left open where the HFE students should learn the necessary basic research skills if not at either BSc or MSc level. It is already now recognized that HFE will only be able to fulfill labor-market demands if the students become lifelong learners (Fisher et al. 2005). However, at the same time the surveyed European HFE institutions still saw lifelong learning as a future concern. Here they are in step with other European HE institutions, who – according to the Trends V study (2007) "reveal no coherent picture of the understanding and implementation of lifelong learning" or even a comprehensive definition of the term.

Observation 14: Finnish stakeholders are not satisfied with what is taught at Finnish universities. At present there appears to be a reluctance to employ university graduates. Research orientation of the studies is seen rather negatively if it is not delivered in the combination research and development. The call for more application orientation leads to a deepening conflict with the UASs.

Observation 15: Concerning a core of generic competence for both BSc and MSc degrees, four competences were identified by Finnish stakeholders: *basic general knowledge in the field of study, capacity to learn, capacity to adapt to new situations* and *information management skills.*

Observation 16: Five additional generic competences where perceived as highly BSc relevant: *interpersonal skills, teamwork, elementary computing skills, initiative and entrepreneurial spirit, and capacity for applying knowledge in practice.*

Observation 17: Six generic competences were judged to be highly MSc relevant: *oral and written communication in native language, ability to work autonomously, capacity for analysis and synthesis, decision making, problem solving*, and *critical and self-critical abilities*. Thus the MSc graduate would be an independent professional with the capacity to analyze and manage

4.11 Importance of subject-specific competences for graduates to be competitive

The subject-specific competences that were ranked as most important among surveyed forestry faculties were *forest management, forest policy, forest ecology, forest products and processing* as well as *protection of forests*. Little importance was given to internationally more important issues such as *agroforestry systems, farm forestry & other types of land use, illegal logging & deforestation, mountain forestry & protective forests, arboriculture, forest fire* and *short rotation forestry*. Analyzing the ranking results, we found that it was easier for the faculties to prioritize subject-specific competences than generic competences. A comparison of the rankings between faculties was complicated by the different ranking approaches of experts. Some ranked most competences at high level (resulting in a high mean) and then marked down less important competences (e.g., FRE, VIE), while some gave most competences a medium score and then awarded more or less important issues a higher or lower score (e.g., JOE, WAG). Stakeholders agreed that the core of subject-specific competences for the BSc and the MSc degree in forestry were *silviculture, information systems and management, logging operations, forest ecology, biodiversity,*

forest economics, forest industry, forest products and processing, forest law, forest ecosystems as well as *lifelong learning.* For the BSc *forest management planning, forest mensuration, timber trade* and *sustainable land-use management* were also mentioned, as was *European forestry, forest policy* and *research and development* for the MSc.

Observation 18: The subject-specific competences that were ranked as most important among surveyed forestry faculties were *forest management, forest policy, forest ecology, forest products and processing* as well as *protection of forests.*

Observation 19: Finnish stakeholders agreed that the core of subject-specific competences both for the BSc and the MSc degree in forestry were *silviculture, information systems and management, logging operations, forest ecology, biodiversity, forest economics, forest industry, forest products and processing, forest law, forest ecosystems* as well as *lifelong learning.* For the BSc *forest management planning, forest mensuration, timber trade* and *sustainable land-use management* were also mentioned. For the MSc, *European forestry, forest policy* and *research and development* were judged as most important.

4.12 Differences in ranking behavior of Finnish stakeholder groups

Looking at the differences in ranking behavior between different stakeholder groups, it became clear that there was rather good consensus concerning the importance of generic competences. However, regarding subject-specific competences there were significant differences in ranking of importance among different groups. Consistently, women as well as the groups of people educated or employed outside of forestry had a much broader view of what they considered highly important for forestry education than men or groups of people who have been educated or employed by forestry institutions. A number of competences were judged significantly more important by all three groups (a: women, b: people with other education than forestry, c: people with other employment than forestry) than by the respective opposite groups (a: men, b: people with forest education or c: people with employment in forestry), namely *agroforestry systems, farm forestry & other forms of land use, climate aspects, forest fire, short rotation forestry, forest certification* and *community & urban forestry.* Several of these issues were not perceived as having any national relevance in Finland (e.g., *short rotation forestry* or *forest fire*) or they were controversially discussed in Finland (e.g., *forest certification* and *climate aspects*). Nevertheless, women who only contribute a share of about 25% to the work force in the Finnish forest sector (Reunala 1999) and people without forestry education or employment obviously perceive a greater need for a broad basis of competence in forestry education to address these issues. In turn, only one subject-specific competence was judged more important by men or people with forestry education or employment, namely *information systems, data management and services.* These results emphasize the need to survey people outside of forestry institutions for opinions concerning forestry education, if social relevance of the educational profile is to be ensured. This is particularly important in the light of the requirement of sustainability to also consider societal demands during curriculum reform. Moreover, surveys can serve as a means to gather weak signals (Moijanen 2003) of trends affecting forestry. They can help to find issues that should be addressed or might be discussed in mission statements that are targeted at the general public as well as at stakeholders.

Observation 20: Among Finnish stakeholder groups there was good consensus about the importance of generic competences. At the same time, concerning subject-specific competences, a number of them were judged significantly more important by three groups (women, people with other education/ employment) than by the respective opposite groups (men, people with forest education or employment). Since men, as well as people with forest education and employment are more heavily involved in curriculum development, a greater involvement of outsiders seems to be desirable to counterbalance groupthink (Janis 1972).

4.13 Forestry students in Finland

Finnish students were difficult to survey, because of rather slow response times and low response rates. Especially male students were responding rather slowly. Even though several reminders about the questionnaires were sent, the estimated response rate remained at or below 15% for Finnish students.

When asked about their main motivation to study forestry, almost half of the students (Finnish and international MSc EF students) replied that they had an interest in the environment, nature, biology, ecology or forests, while one-fifth replied that it was the inter- or multi-disciplinarity of forestry education that attracted them. Most of the Finnish students were satisfied or extremely satisfied with their forestry studies. Very few students mentioned that studies were too difficult and time consuming, that the courses were not interesting or that the university environment or the student group was not right for them. Instead, reasons for disappointment with forestry studies were poor chances of finding a job, followed by criticism about the quality of teaching being lower than expected, and a perceived lack of systematic progress in teaching. This supports the notion that not necessarily more or different content is needed, but rather improved teaching quality (Fisher et al. 2005). About half of the students mentioned that they had sometimes or often thought about dropping out. The alternatives they had considered often had to do with business economics, finding work instead, or to change studies to a broad range of other disciplines. Fewer students – but still more than 50% of respondents – were satisfied or extremely satisfied with personal support. Opinions on the BP were quite diverse. Most had heard about it, but comments and opinions from Finnish students were rather negative. Concerning the BSc degree, more than half of the surveyed students thought that it made mobility within Europe easier and that it helped students to change universities or disciplines, but uncertainty about the acceptance of the degree by employers was a concern. Only 23% of the students believed that the BSc would shorten study times and 31% anticipated that the BSc would increase competition between graduates from universities and UASs. Finnish students were particularly negative in their opinions about the BSc degree (a feature they shared with university experts and Finnish stakeholders). This was often expressed through remarks about increasing and unfair competition between university and UAS graduates. It was perceived as being unfair that graduates of UASs would be – in their eyes – upgraded to the level of university graduates. This was considered as doubly unfair, because UAS studies were perceived as less demanding than university studies while at the same time offering better chances in the labor market.

When looking at the importance ranking of generic competences, the students from the Finnish degree programs in HEL and JOE showed striking consensus. However, the degree of overlap with the rankings produced by university experts and stakeholders was small.

Also when asked about the importance of competences in finding a job, the agreement of students from HEL and JOE was high. However, apart from one competence (*knowledge of a foreign language*), the ranking of the most important competences to find a job was different from the competences perceived important in HFE courses. Two competences were thought to be particularly under-emphasized in courses by students in Finnish degree programs, namely *project design and management*, and *leadership skills*. Interestingly, *grounding in basic knowledge of the field* dropped from fourth place in importance in forestry courses to the least important in finding a job. Also *basic knowledge in forestry* dropped from most important in forestry courses to mid-field in importance in finding a job. Obviously students do not think that basic forestry knowledge will be a decisive factor in finding a job. Even though students in Finnish programs think that *knowledge of a foreign language* is very important in forestry courses and will also be very important in finding a job, intercultural issues were ranked at the bottom of the ranking. *Computing skills* probably were not ranked higher in importance, because elementary computing skills are crucial for students of all disciplines so that they do not necessarily offer a competitive edge in the search for a job. Competences that were perceived to be important in the courses as well as important in finding a job were *knowledge of a foreign language, teamwork, problem solving*, and *capacity to learn*.

When asked about subject-specific competences that students were interested in as opposed to competences that would be most important in finding a job the core competences were *international forestry skills* and *economic knowledge*. The students were also interested in studying more about *sustainable resource management* and *sociolog*y, but did not believe that these competences would be beneficial to find employment. At the same time, *applied knowledge* and *information service skills* were seen as important to find employment, but not as particularly interesting.

Observation 21: the greatest motivation for Finnish students to study forestry sciences was an interest in the environment in general and the interdisciplinarity forest sciences offer.

Observation 22: The majority of students in Finland were satisfied with their studies, even though the employment situation was not satisfactory, studies were judged as being rather too simple, teaching quality was judged as being rather low, particularly at Joensuu University, and a lack of systematic progress in teaching was perceived.

5   SUMMARY

A systematic collection of the following data and surveys of the following groups at regular time intervals proved helpful to gather relevant information for curriculum development:

Indicators

Statistical student data
- o   Application numbers (if selection process is in place)
- o   Number of student enrollment for fulltime studies (separate for each degree program offered), split up for sex and nationality of students
- o   Drop-out numbers (reasons for drop-out should be monitored)

- o Graduation numbers and employment data
- o Numbers, destination and duration of student exchange

*Survey*s
- o Regular coordinated surveys of students (national and international) about teaching quality (every year)
- o Regular coordinated surveys of students (national and international) about competences (every two to three years)
- o Regular coordinated survey of graduates about competences (every three to five years)
- o Regular coordinated survey of stakeholders about competences (every three to five years)
- o Regular survey of/cooperation with institutions offering similar degrees (every three to five years)

Common trends across the surveyed European forestry faculties wereobvious. The eight surveyed forestry faculties did not consider themselves as competing for students with other higher education institutions nationally or internationally. Without the Bologna Process, the BSc and the MSc degree would not have been introduced, and the labor-market relevance of the BSc was doubted by almost all experts. Profiling of faculties and a strengthening of the research aspect at universities was seen as necessary. The BP clarified the political commitment to change, and thus streamlined tendencies towards fundamental reforms already visible at forestry faculties even before the Bologna Declaration. However, the vagueness of the guidelines for implementation and the lack of a strategy at university level caused a general insecurity during the reform, and also funding for the administrational burden and networking remained scarce. A general lack of stakeholder involvement during change was visible, even though quality assurance and accreditation efforts were made. Concerning forestry studies there was a perceived broadening of the scope of higher forestry education due to a problematic labor market situation in all countries. This was visible in a change of the student pool (i.e., more urban, female and foreign students) and in name changes and sometimes mergers of degree programs and faculties changing names from *forestry* to, e.g., *forest sciences*.

During the period from 1990-2005, the attractiveness of forestry studies was higher in Finland than in other European countries. The strongest motivation for students in Finland to study forestry was a general interest in nature and the environment. Surveyed Finnish students were in general satisfied with their forestry studies but frustrated with the employment situation and the quality of teaching. Concerning gender equality, Finnish universities had approximately equally large numbers of male and female students. By comparison, Finnish faculties proved late adopters of change, since many aspects requiring change in other countries (e.g., decreasing student numbers and financing, bad image of forestry, difficult labor-market situation) had a late or no impact on Finland. Concerning the traditional core areas of forestry in Finland there was an oversupply of forestry graduates from universities for the amount of open positions. There are two options: the forestry faculty student pool needs to be large enough to ensure broad education leading to a broader labor-market profile or for less students curricula need to be reorganized with more emphasis on interdisciplinary cooperation and outsourcing of specialization. Outsourcing can be done based on students' preferences as well as labor-market needs analyzed through structured surveys at regular time intervals. Consistent tutoring and mentoring programs

ought to be developed to support students in the transition phase to employment, integrating the existing occupational services at the universities and employment agencies if higher forestry education is to move away from the traditional job profile. The involvement of occupational services also allows gathering data on employment and contracts of graduates.

For quality assurance faculties develop mission statements. This should be done based on information gathered through stakeholder surveys. The results of the surveys conducted during this research suggest a perspective of a continuing profiling of HFE on business economics at Helsinki University while the University of Joensuu ought to strengthen the cooperation with social sciences and perhaps the focus on international forestry. Finnish students expressed interest in a larger amount of courses dealing with international forestry, sociology and sustainable resource management, while they believed that most relevant for finding a job later would be application skills, foreign language skills, as well as economic and international forestry knowledge. The traditional scope of forestry education in Finland cannot ensure the employment of university graduates in adequate positions. A broadening and internationalization of the competences taught by forest science degree programs will be crucial for meaningful professional education in the future.

The University of Joensuu has been very successful in attracting large numbers of foreign graduate students. However, the globalization of markets makes internationalization an imperative for all forestry students. In this light, faculties need to consider carefully whether to add specific programs for foreign students or to change the current programs (particularly forest economics) to English language instruction. National students are, according to this study, often reluctant to accept English language teaching but the globalization of markets gives good reasons to force them to do so. Appropriate participation tools for foreign students and stakeholders still need to be developed to ensure sustainable development of HFE. Participation needs to be carefully coordinated and timed to maximize response rates with feedback on the results given to participants.

The Finnish stakeholder surveys proved very interesting, since especially individuals who are not strongly socialized in forestry through education and or employment and also women had a much broader view on which competences forest sciences graduates need. Finnish stakeholders in general questioned the need of a strong focus on research skills if they weren't associated with development, and put more emphasis on application skills and teamwork for the undergraduate level. However, a stronger application orientation particularly at the BSc level creates a need for profiling in relation to UASs and further thought on the opportunities of horizontal transition between institutions. Additionally to existing cooperation with biology, further cooperation with economic and computer sciences, as well as language departments was suggested.

Turning to subject-specific competences, Finnish stakeholders gave silviculture, forest management planning, and logging operations and technology the highest ranks for the BSc level, while for the MSc level forest economics, research and development and information systems were considered most important. These rankings of subject-specific competences coincided quite well with the joint emphases at Helsinki and Joensuu University. When looking at the subject-specific competences considered by Finnish stakeholders to be both BSc and MSc relevant it is a broad set constituted by silviculture, forest management planning, information systems, forest economics, forest industry, forest products, fuel and energy, logging operations, biodiversity, forest ecology, forest law. When looking at these competences, three areas of special emphasis become visible: one focusing on management of forests (a potential BSc profile), one on economy and industry and one on the environment and biodiversity (two potential MSc profiles). If comparing subject-specific

competences which are faculty- as well as stakeholder-relevant in Finland, the core is constituted by research and development, information systems, forest economics, forest products and processing, forest policy, silviculture, and logging operations and technology. Thus focus points could be adjusted during curriculum development, if surveys were made at regular time intervals. It would, of course, be desirable to choose larger groups to poll, even though it is difficult to find a large pool of people, if selection is to be random but according to interest in forestry of the particular individual. Forest owners might be a good group to poll on a regular basis, since they provide a large group with diverse personal and educational background in Finland.

All in all, the perspectives of forest science education in Finland are very good, if during curriculum development careful consideration is given to the needs of the labor market and active assistance through occupational services is offered throughout the studies and especially in the graduation phase. As shown in this exploratory study, surveys of relevant stakeholder groups and related institutions can help to set the focus of degree programs during reforms. A continued focus on economic aspects at Helsinki University and specialization on environmental, social and international aspects of forest science at Joensuu University could be considered for profiling at the MSc level.

Severe limitations for Finnish HFE can arise in the future, if there is no success in the introduction of labor-market relevant undergraduate degrees. In this context, the unhealthy competition of universities and polytechnics needs to be changed to increase the chances of permanent employment of university graduates outside the higher education sector. Institutions offering similar education need to find ways to work hand in hand also where it comes to horizontal and vertical transition between institutions, since protectionism ultimately leads into an educational dead end. In the long term this makes no sense in a harmonized EHEA with European borders, since it will only lead to educational tourism in search of an easier solution abroad.

6   REFERENCES

ACQUIN 2006. [Internet site].
http://www.acquin.org/de/akkreditiert/akkreditiertstudiengang2.php?id=8&titel_studiengan g=&standort=M%C3%BCnchen&hochschule= [retrieved 20.05.2008].

Allen, J., Boezerooy, P., Weert, E. De, Velden, R. Van der, 2000. Higher education and graduate employment in the Netherlands. European Journal of Education 35 (2). 211-219.

Bartelink, H., Schmidt, P. 2006. Forestry education between science and practice. In: Bartelink, H., Schmidt, P (eds.). Forestry education between science and practice – Proceedings of the SILVA-IUFRO Symposium held at Wageningen University, Wageningen, 6.4.-9.4.2005. SILVA Publications 3, Joensuu University Press. 1-3.

Belfield, C. R. 2000. Economic principles for education – theory and evidence. Edgar Elgar Publishing. 252 pp.

Bergen Communiqué 2005. [Internet Site].
http://www.bologna-bergen2005.no/Docs/00-Main_doc/050520_Bergen_Communique.pdf [retrieved 20.05.2008].

Berlin Communiqué 2003. [Internet Site].
http://www.bologna-bergen2005.no/Docs/00-Main_doc/030919Berlin_Communique.PDF [retrieved 20.05.2008].

Bologna Declaration 1999. [Internet Site].
http://www.bologna-bergen2005.no/Docs/00-Main_doc/990719BOLOGNA_DECLARATION.PDF [retrieved 20.05.2008].

Bologna Process 2008. [Internet Site].
http://www.ond.vlaanderen.be/hogeronderwijs/bologna/pcao/ [retrieved 27.05.2008].

Brown, N. 2003. [Internet Site].
A critical review of forestry education. Bioscience Education e-journal 1, article 1-4. http://www.bioscience.heacademy.ac.uk/journal/vol1/beej-1-4.htm [retrieved 20.05.2008].

Brundtland, G. H. (ed.) 1987. "Our common future: The World Commission on Environment and Development", Oxford, Oxford University Press.

Crosier, D., Purser, L. & Smidt, H. 2007. [Internet site].
Trends V: Universities shaping the European Higher Education Area. 97 p. EUA Report. European University Association. Available from http://www.eua.be/fileadmin/user_upload/files/Publications/Trends_V_universities_shapin g_the_european_higher_education_area.pdf. [retrieved 20.05.2008].

Danish Evaluation Institute 2002. Agricultural Science – international comparative evaluation of agricultural science related BSc programmes. Vester Kopi. 149 pp.

Europass 2006. [Internet site].
http://europass.cedefop.europa.eu/europass/home/vernav/InformationOn/EuropassDiploma Supplement/navigate.action [retrieved 15.08.2008].

European Commission 2002. [Internet site].
Perception of the wood-based industries – qualitative study. Luxembourg: Office for official publications of the European communities. ISBN 92-894-4125-9. http://europa.eu.int/comm/enterprise/forest_based/perceptionstudy_en.pdf [retrieved 20.05.2008].

European University Association 2008. [Internet site].
http://www.eua.be/index.php?id=65 [retrieved 15.08.2008].

Eurydice 2005. [Internet site].
Focus on the structure of higher education in Europe – 2003/2004: National Trends in the Bologna Process. 92 pp. http://www.bologna-bergen2005.no/Docs/02Eurydice/0504_Eurydice_National_trends.pdf [retrieved 20.05.2008].

Federal Ministry of Education and Research 2005. [Internet site].
 Bachelor and Master courses in selected countries compared with Germany. Bundesministerium für Bildung und Forschung. 52 pp. http://www.bmbf.de/pub/bachelor_master_en.pdf [retrieved 20.05.2008].

Fisher, R.F., Fox, T.R., Harrison, R.B., Terry, T. 2005. Forest soils education and research: trends, needs and wild ideas. Forest Ecology and Management 220. 1-16.

Flick, U. 1995. Triangulation. In: Flick, U., Kardoff, E. von, Keupp, H., Rosenstiel, L. von, Wolff, S. (eds.). Handbuch qualitative Sozialforschung – Grundlagen, Konzepte, Methoden und Anwendungen. Beltz Psychologie Verlags Union, Weinheim. 432-434.

Flick, U. 2004. Qualitative Sozialforschung – eine Einführung [Qualitative social sciences – an introduction]. Rowohlt Taschenbuch Verlag. 446 pp.

Future Forum on Forests 2008. [Internet site].
http://www.metsafoorumi.fi/forum.htm [retrieved 15.08.2008].

Gonzales, J., Wagenaar, R. 2003. [Internet site]. Tuning Educational Structures in Europe – Final Report, Project Phase 1. 316 pp. http://www.tuning.unideusto.org/tuningeu/index.php?option=com_docman&task=docclick&Itemid=59&bid=17&limitstart=0&limit=5 [retrieved 26.05.2008].

Gritten, D. 2003. [Internet site].
Comparative analysis of forestry curricula for the development of ICT in forestry education. Masters' thesis, University of Joensuu. 112 pp. http://www.joensuu.fi/metsatdk/english/publications/listaaJulk.php?nayta=1&tyyppi=4 [retrieved 23.05.2008].

Hatch, E., Lazaraton, A. 1991. The research manual – design and statistics for applied linguistics. Heinle and Heinle Publishers, Boston, Mass. 628 pp.

Hellström, E. & Reunala, A. 1995. Forestry conflicts from the 1950s to 1983. European Forest Institute. Research Report 3. 92 pp.

Hermans, J. 2005. [Internet site]. The X-factor – internationalisation with a small 'c'. In: Calderon-Peter, M., Heath, S.B. (Eds. Providing our graduates with a global perspective through real and virtual student exchange. Interuniversity Consortium for Agricultural and Related Sciences. http://www.eaie.nl/pdf/jointseminar/Hermans.pdf [retrieved 20.05.2008].

Huss, J., Schmidt, P. 1998. Objectives of forestry university education according to current curricula. In: Schmidt, P., Huss, J., Lewark, S., Pettenella, D., Saastamoinen, O. (eds.). New requirements for university education in forestry. Demeter Series 1. p. 95-107.

Janis, I. (1972). Victims of Groupthink: A Psychological Study of Foreign-Policy Decisions and Fiascoes. Boston: Houghton Mifflin. 277 pp.

Kanowski, P. 2001 [Internet site]. What is a faculty of forestry and do we need them? Meeting of International University Forest Education Leaders, December 4, 2001, Vancouver, BC Canada. Available at: http://www.fao.org/docrep/meeting/007/AD234E/ad234e00.htm [retrieved 20.05.2008].

Kellermann, P., Sagmeister, G. 2000. Higher education and graduate employment in Austria. European Journal of Education 35 (2). 158-164.

Kennedy, J. J., Dombeck, M. P., Koch, N.E. 1998. Values, beliefs and management of public forests in the western-world at the close of the 20th century. In: Schmidt, P., Huss, J., Lewark, S., Pettenella, D., Saastamoinen, O. (eds.). New requirements for university education in forestry. Demeter Series 1. 15-34.

Kivinen, O., Nurmi, J., Salminiitty, R. 2000. Higher education and graduate employment in Finland. European Journal of Education 35 (2). 165-177.

Lewark, S., Pettenella, D., Saastamoinen, O. 1998. Labour markets for university educated foresters: recent developments and new perspectives. In: Schmidt, P., Huss, J., Lewark, S., Pettenella, D., Saastamoinen, O. (eds.). New requirements for university education in forestry. Demeter Series 1. 69-88.

London Communiqué 2007. [Internet site]. http://www.dcsf.gov.uk/londonbologna/uploads/documents/LondonCommuniquefinalwithL ondonlogo.pdf [retrieved 01.08.2008].

MCPFE 2007. [Internet site]. The State of Europe's Forests. http://www.mcpfe.org/files/u1/publications/pdf/state_of_europes_forests_2007.pdf [retrieved 15.08.2008].

Miller, H. 2004. Trends in forestry education in Great Britain and Germany, 1991 to 2001. Unasylva 216 (55): 29-32.

Ministry of Education 2005. [Internet site].
OECD thematic review of tertiary education – country background report for Finland. Publications of the Ministry of Education, Finland (38). 95pp. https://www.oecd.org/dataoecd/14/15/36039008.pdf [retrieved 20.05.2008].

Moijanen, M. 2003. Heikot signaalit tulevaisuudentutkimuksessa [Weak signals in Futures research]. Futura 4. 48-60.

Munich Model 2006. [Internet site].
http://portal.tum.de/studium/abschluesse/muenchnermodell (in German), http://www.upm.es/estudios/eduSup/conferencias/docs/keidel_texto.pdf (in English), [both retrieved 15.08.2008].

Nair, C.T.S. 2004. What does the future hold for forestry education? Unasylva 216 (55): 3-9.

Nexus Delfix 2006. [Internet site].
http://nexusdelfix.internetix.fi/en/materiaalit/etusivu [retrieved 15.08.2008]

Niskanen, A., Pelkonen, P. 2005. Kehittämistarpeet metsäalalla [Development needs in the forest profession]. In: Niskanen, A. (Ed.). Menestyvä metsäala ja tulevaisuuden haasteet [Successful forest profession and the challenges of the future]. Gummerus Kirjapaino Oy. 109-115.

Oxford English Dictionary 2008. [Internet site]. http://www.oed.com/ [retrieved 15.08.2008].

Pelkonen P. 1998. Forestry faces new challenges in the Nordic countries: the changing goals of forestry and new educational requirements for the foresters of the future. In: Schmidt, P, Huss, J., Lewark, S., Pettenella, D., Saastamoinen, O. (eds). New Reqirements for university education in forestry. Proceedings of a workshop held in Wageningen, The Netherlands. Demeter Series 1. 35-41.

Pelkonen, P. 2004. Objectives and strategies for higher forestry education in the European integration. In: Tahvanainen, L, Pelkonen, P. (eds.). ICT in higher forestry education in Europe. SILVA Publications 1. 11-18.

Pelkonen, P., Schuck, A. 2006. Higher forestry education in the 21st century. In: Bartelink, H., Schmidt, P (eds.). Forestry education between science and practice – Proceedings of the SILVA-IUFRO Symposium held at Wageningen University, Wageningen, 6.4.-9.4.2005. SILVA Publications 3, Joensuu University Press. 6-14.

Puhakka, A., Tuominen, V. 2006. [Internet site]. Viisi Vuotta myöhemmin Joensuun yliopistosta vuosina 1999 ja 2000 valmistuneiden maistereiden ja lastentarhanopettajien työllistyminen [The employment situation of Masters and kindergarten teachers graduates

from the university of Joensuu during the years 1999 to 2000 five years after graduation]. Hallintoviraston raportteja ja selvityksiä N:o 41. http://www.joensuu.fi/urapalvelut/Uraseuranta/5vuottamyohemmin.pdf . ISBN 952-458-803-X [retrieved 20.05.2008].

Rannikko, P. 1996. Local Environmental Conflicts and the Change in Environmental Consciousness. Acta Sociologica, Vol. 39, No. 1, 57-72.

Rannikko, P. 1998. Living in the periphery. In: Rannikko, Pertti & Schuurman, Nora (eds.). The art of living in a taiga: human beings and nature in the North Carelia Bioshere Reserve. University of Joensuu Press. Research Centre of Karelia No 120, p. 139-162.

Saarinen, T. 2005. "Quality" in the Bologna Process: from "competitive edge" to quality assurance techniques. European Journal of Education 40(2). 189-204.

Saastamoinen, O. 1996. New Forest Policy: The rise of environmental and the fall of social consciousness? In: Oksa, J., Rannkikko, P. (eds). New Rural Policy. Finnish Journal of Rural Research and Policy (English Supplement). 125-137.

Sample, V.A., Ringgold, P.C., Block, N.E., Giltmier, J.W. 1999. Forestry education: Adapting to the changing demands on professionals. Journal of Forestry, 97 (9): 4-10.

Schanz, H. 1999. Social changes and forestry. In: Pelkonen, P., Pitkänen, A., Schmidt, P, Oesten, G. Piussi, P., Rojas, E. (eds). Forestry in changing societies in Europe. Joensuu: DEMETER Series, part 1, 59-82. ISBN: 951.98298-1-4 (osa 1). 59-82.

Schomburg, H. 2000. Higher education and graduate employment in Germany. European Journal of Education 35 (2). 189-200.

Schmidt, P., Huss, J., Lewark, S., Pettenella, D., Saastamoinen, O. (eds.) 1998. New requirements for university education. Demeter Series 1. 394 pp.

Schuck, A., Pelkonen, P. 2006. Enrolment in forestry education programs at eight European Universities between 1990 and 2004. In: Bartelink, H., Schmidt, P (eds.). Forestry education between science and practice – Proceedings of the SILVA-IUFRO Symposium held at Wageningen University, Wageningen, 6.4.-9.4.2005. SILVA Publications 3, Joensuu University Press. 60-69.

Schuck, A. 2006. Which issues do European forestry faculties discuss with students and student unions during curriculum reform in higher forestry education? In: Fürst, C., Janecek, V., Lorz, C., Makeschin, F., Podrazky, V., Vacik, H. (eds.). Future-oriented concepts, tools and methods for forest management and forest research crossing European borders – Proceedings of the Virtual Conference ForwardFORESTs. 184-191.

Schwarz, S., Rehburg, M. 2004. Study costs and direct public student support in 16 European countries – towards a European higher education area? European Journal of Education 39 (4). 521-532.

Shavelson, R. J., Huang, L. 2003. Responding responsibly to the frenzy to assess learning in higher education. Change, Jan./Feb. 2003. 11-19.

Sorbonne Declaration 1998. [Internet site]. http://www.bologna-bergen2005.no/Docs/00-Main_doc/980525SORBONNE_DECLARATION.PDF [retrieved 20.05.2008].

Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany 2003. [Internet site]. http://www.kmk.org/doc/publ/LaendergemStrukturvorgaben_englisch.pdf [retrieved 15.08.2008].

Strauss, A. L. 1987. Qualitative analysis for social scientists. Cambridge University Press. 319pp.

Suda, M., Beck, R. 1998. Requirements for forestry education at universities in the future. In: Schmidt, P, Huss, J., Lewark, S., Pettenella, D., Saastamoinen, O. (eds). New Reqirements for university education in forestry. Proceedings of a workshop held in Wageningen, The Netherlands. Demeter Series 1. 53-61.

Tauch, C. 2004. Almost half-time in the Bologna Process – where do we stand? European Journal of Education 39 (3). 275-288.

Teichler, U. 1999a. Internationalisation as a Challenge for Higher Education in Europe. Tertiary Education and Management 5 (1). 5 - 22

Teichler, U. 1999b. Research on the relationships between higher education and the world of work: past achievements, problems and new challenges. Higher Education 38: 169-190.

Tikkanen, I. 1981. Effects of public forest policy in Finland – an econometric approach to empirical policy analysis. Silva Fennica 15 (1). 38-64.

Turunen, K. 2002. [Internet site]. Metsäalan korkeakoulutuksen määrällinen ja laadullinen ennakointi [Quantitative and qualitative prediction of higher education in the forest sector]. Hankkeen loppuraportti, Metsänhoitajaliitto ry. http://www.metsanhoitajat.fi/?id=80 [retrieved 20.05.2008].

Vicentini, P. (2005). Sustainable forestry, an etymological search for equitable development. In: Erkkilä, A., Heinonen, R. E., Oesten, G., Pelkonen, P., Saastamoinen, O. (eds.). European forests and beyond, an ethical discourse. Silva Carelica 49. 177-184.

Wals, A. E. J., Caporali, F., Pace, P., Slee, b:, Sriskandarajah, N., Warren, M. (eds.) 2004. Education and training for integrated rural development – stepping stones for curriculum development. Reed business information. 88 pp.

Wiedemann, P. 1995. Gegenstandsnahe Theoriebildung [Development of object-related theory]. In: Flick, U., Kardoff, E. von, Keupp, H., Rosenstiel, L. von, Wolff, S. (eds.). Handbuch qualitative Sozialforschung – Grundlagen, Konzepte, Methoden und Anwendungen. Beltz Psychologie Verlags Union, Weinheim. 440-445.

Yorke, M. 2004. Employability in the undergraduate curriculum: some student perspectives. European Journal of Education 39 (4). 409-427.

ZVS 2006. [Internet site]. Zentralstelle für die Vergabe von Studienplätzen (Central Institute for the Distribution of Study Placements). http://www.zvs.de/ [retrieved 15.08.2008].

Appendix 1: Questionnaire 1 - Faculty profile (timeframe 1990-2004)

Statistical and general information about the faculty

Name of faculty

Address

Contact person

1.1. Development of student enrolment (see attached Excel sheet)

1.2. Offered degree programs and degrees
If more than one degree program is offered, please use separate sheets or mark the replies by numbering!

Full name of degree program (year of introduction)

Full name of awarded degree (if it differs from program name)

1.3. Credit system used by the faculty (if it has changed, please indicate the year of change):

1.4. Total credit points needed for the degree

	for a Diploma, equaling		credit points per year
for a Bachelor's degree, equaling		credit points per year
for a Master's degree, equaling		credit points per year

If not in ECTS, please mention conversion factor:

1.5. Does the faculty choose the students?

Yes (please specify selection procedure under comments)
During the last 5 years all applicants were admitted
No
Comment:

1.6. Internal/external evaluation of teaching/curriculum of the faculty:

a. Which degree program?

b. Which kind of evaluation?

c. Year of evaluation?

d. Conducted by which institution?

e. Have the results been published internally or externally? If yes, please indicate bibliographical reference:

1.7. Is teaching evaluated by the students on a regular basis for all courses the faculty offers?

☐ Yes, every _____ years
☐ No

Comment:

1.8. Are the students' evaluation results made available to lecturers and students?

☐ Yes
☐ No

Comment:

1.9. What does the faculty offer lecturers/teachers to support and improve their pedagogical skills?

Are any of these offers obligatory?

1.10. Do tutors support the students (please specify in the comments if the tutors are students or teachers)?

☐ Yes, during the first weeks
☐ Yes, during the first year
☐ Yes, during the whole period of their studies
☐ Yes, during the final thesis
☐ No

Comment:

1.11. **How important is at present Information and Communication Technology (ICT) for teaching purposes at the faculty?**

☐ Extremely important
☐ Important
☐ Not important

Comment:

1.12. **What kind of experiences has the faculty had with ICT as a teaching tool?**

☐ Very positive
☐ Neutral
☐ Rather negative

Comment:

1.13. **Financial situation regarding <u>teaching activities</u> (last 5 years):**

☐ Rising budget
☐ Stable budget
☐ Decreasing budget

Can you <u>indicate a percentage</u> by which the budget has changed in the last 5 years?

Yes, by approximately   *%* ☐

No ☐

2.   <u>**Changes within the faculty for the timeframe 1990-2004**</u>

a) Change of name, mergers with other faculties (please indicate the year):

b) Reform(s) of curriculum (please mention type of reform and indicate the year):

c) Other changes and reforms (please name change/reform and indicate the year):

d) New chairs/terminated chairs (please name the chairs and indicate the year):

e) Planned new degrees (please name planned title and indicate year of introduction):

f) Introduction of a general, multilingual diploma supplement (year of introduction):

2.1. **Will the currently offered degree(s) mentioned under 1.2. continue to exist after the introduction of planned degrees (see 2.e)?**

Yes, on a long-term basis

Yes, on a medium-term basis

No, the degree (s) will be/ has/have been phased out when the new

degrees were established (enrolment possible until: [   ])

Comment:

2.2. **How high does the faculty estimate the current acceptance of Master's and Bachelor's degrees on the national employment market?**

	For the Bachelor	For the Master
High		
Medium		
Low		

2.3.a. **If your faculty currently offers a Bachelor's degree: On average, what percentage of students leave the faculty with a bachelor degree every year?**

[   ] %

Comment:

2.3.b. **For all faculties who plan to introduce a Bachelor's degree: What percentage of students does the faculty expect to leave every year on average with a Bachelor's degree in 5 years time?**

[   ] %

Comment:

2.5. **The following questions deal with the process of curriculum reform:**

2.5.a. **How important is definition of a faculty profile in relation to other forestry faculties in the same country during curriculum reform?**

Extremely important

Important

Not important

Comment:

2.5.b.   How important is definition of a faculty profile in relation to other forestry faculties <u>in Europe</u> during curriculum reform?

☐ Extremely important
☐ Important
☐ Not important

Comment:

2.5.c.   How important is definition of a faculty profile in relation to polytechnics during curriculum reform?

☐ Extremely important
☐ Important
☐ Not important

Comment:

2.5.d.   How important are labor market demands during curriculum reform?

☐ Extremely important
☐ Important
☐ Not important

Comment:

2.5.e.   How important are societal demands during curriculum reform?

☐ Extremely important
☐ Important
☐ Not important

Comment:

2.5.f.   How important are aspects of lifelong learning during curriculum reform?

☐ Extremely important
☐ Important
☐ Not important

Comment:

2.5.g. How important is the inclusion of students' demands during curriculum reform?

☐ Extremely important
☐ Important
☐ Not important

Comment:

2.5.h. How important is the attractiveness for foreign students during curriculum reform?

☐ Extremely important
☐ Important
☐ Not important

Comment:

3. *Continuous and long-term co-operation in teaching activities*

3.1. The faculty co-operates closely with the following departments (please check appropriate answer with x):

☐ agricultural sciences
☐ chemistry
☐ biology
☐ geography
☐ soil science
☐ politics
☐ economics
☐ law
☐ computer science
☐ philosophy
☐ languages
☐ history
☐ education
☐ psychology
☐ sociology
☐ other:_____

3.2. <u>**Teaching co-operation with other national or European forestry faculties**</u>
(please mention faculty name/country and time frame of the co-operation)

a) Joint courses:

b) Joint teaching and development projects (e.g. e-Learning):

c) Joint degrees:

d) Other forms of co-operation (e.g. faculty networks, research/educational centers, doctoral programs):

e) Student exchange (please name the 5 most important European universities and provide the total number of European universities, with which students are exchanged):

f) Exchange of lecturers on a regular basis (please name 5 most important European universities and provide the total number of universities, with which lecturers are exchanged):

g) Degree programs taught in English at the faculty:

3.3. <u>**Teaching co-operation with other forestry institutions**</u> (please mention name/country and time frame)

- Polytechnics:

- Forest research institutes:

- Other:

4. <u>**Teaching profile of the University**</u>

Please mention for each of the degree programmes your faculty offers the core topics in teaching, describing the teaching profile of your faculty at this point in time. Please use separate sheets for each degree program offered.

Please enter full name of degree program:

4.1   Importance in the area of general competences:

1 = none; 2 = weak; 3 = considerable; 4 = strong.

1. Capacity for analysis and synthesis
2. Capacity for applying knowledge in practice
3. Planning and time management
4. Basic general knowledge in the field of study
5. Grounding in basic knowledge of the profession
6. Oral and written communication in your native language
7. Knowledge of a second language
8. Elementary computing skills
9. Research skills
10. Capacity to learn
11. Information management skills
12. Critical and self-critical abilities
13. Capacity to adapt to new situations
14. Capacity for generating new ideas (creativity)
15. Problem solving
16. Decision-making
17. Teamwork
18. Interpersonal skills
19. Leadership
20. Ability to work in an interdisciplinary team
21. Ability to communicate with non-experts (in the field)
22. Appreciation of diversity and multiculturality
23. Ability to work in an international context
24. Understanding of cultures and customs of other countries
25. Ability to work autonomously
26. Project design and management
27. Initiative and entrepreneurial spirit
28. Ethical commitment
29. Concern for quality
30. Will to succeed

Please rank below the **five most important competences** for graduates according to your opinion. Please write the number of the item within the box. Mark on the first box the most important, on the second box the second most important and so on.

1.	*Item number*	
2.	*Item number*	
3.	*Item number*	
4.	*Item number*	
5.	*Item number*	

Comment:

4.2   Importance in the area of subject-related competences. Missing competences may be added.

1 = none; 2 = weak; 3 = considerable; 4 = strong.

(This list is based on the classification by CABI, http://www.cabi-publishing.org/SubjectDisplay.asp?subjectarea=Pla&subject=Forestry, and was enlarged with the assistance of several experts adding missing relevant topics)

☐ Silviculture
☐ Mensuration and inventories
☐ Modelling of forest resources
☐ Forest management
☐ Forest policy
☐ Forest economics
☐ Forest ecology
☐ Ecosystem analysis and modelling
☐ Agroforestry systems, farm forestry and other types of land use
☐ Non-wood forest products
☐ Biology of forest trees
☐ Genetics, breeding and biotechnology
☐ Climate aspects
☐ Soil aspects
☐ Fire
☐ Forest health
☐ Wildlife ecology and management
☐ Biodiversity
☐ Sustainable land-use management
☐ Short rotation forestry
☐ Tropical Forestry
☐ International Forestry

☐	European Forestry
☐	Mountain forestry and protective forests
☐	Protection of forests
☐	Arboriculture
☐	Forest products and processing
☐	Logging operations and technology
☐	Illegal logging and deforestation
☐	Forest certification
☐	Timber trade
☐	Forest industry
☐	Fuel and energy
☐	Environmental and service aspects
☐	Community and urban forestry
☐	Sociological, cultural and related economic aspects
☐	Research and development: techniques and methodology
☐	Information systems, data management and services
☐	Activities in teaching and education
☐	Life-long learning and professional training
☐	Forestry ethics and ethical codes of conduct in forestry

106

Appendix 2: Questionnaire 1 – Faculty sheet for statistical information

study year:													
	90/91	**91/92**	**92/93**	**93/94**	**94/95**	**95/96**	**96/97**	**97/98**	**98/99**	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**
Total student number (first semester)														
female students (first semester)														
male students (first semester)														
foreign students (first semester)														
Total number of drop-outs (exmatriculation without degree)														
Total number of students graduating														

	90/91	**91/92**	**92/93**	**93/94**	**94/95**	**95/96**	**96/97**	**97/98**	**98/99**	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**
student exchange (total number of exchanged students)														
foreign guest students														
faculty students going abroad														

5 most important home universities of foreigners:

5 most important destinations for faculty students:

Average duration of stay of foreign students (in months):

Average duration of stay of faculty students (in months):

106

Appendix 3: Questionnaire 2 - The Future of Forestry Education
Kysely: Metsäalan koulutuksen tulevaisuus

English *and Finnish version*

It is difficult to know the importance of forestry-related issues in the future and where the future of forestry education at universities lies. Nevertheless everyone agrees that university education should be as up-to-date and relevant as possible. To make sophisticated suggestions about future needs of forestry education, we would like to ask your kind co-operation. Please judge the importance of interdisciplinary co-operation, as well as general and subject-related skills for graduates in the year 2010.

Tutkimuksella on tarkoitus selvittää metsäopetuksen sisällön tulevaisuuden tarpeita. Arvioi oman kokemuksesi perusteella yleisten ammatillisten kykyjen ja taitojen sekä metsäalan eri aihealueiden osaamisen merkitystä yliopistosta valmistuvalle metsänhoitajalle vuonna 2010. Yliopistojen tutkintorakenne on muuttumassa yhteiseurooppalaisen Bolognan prosessin seurauksena. Yliopistotutkinnoista tulee kaksiportaisia, joista alemman yliopistotutkinnon (Barchelor taso) suorittamisen arvioidaan vievän keskimäärin kolme vuotta ja opintojen täydentämiseen ylemmällä maisteritason tutkinnolla kaksi vuotta lisää.

Interdisciplinary co-operation
Poikkitieteellinen yhteistyö

In the future, forestry departments and faculties should co-operate closely and continuously with the following departments or faculties:
Yliopistollista metsäopetusta antavien tiedekuntien tulisi tulevaisuudessa vuonna 2010 tehdä yhteistyötä erityisesti seuraavien tieteenalojen kanssa:

Please mark your choices with an/ *Merkitse valintasi* | X |

	English	Finnish
	agricultural sciences	maataloustieteet
	chemistry	kemia
	biology	biologia
	geography	maantiede
	soil science	maaperäoppi
	economics	taloustieteet
	law	oikeustieteet
	politics	politiikka
	computer science	tietojenkäsittelytieteet
	philosophy	filosofia ja etiikka
	languages	kielet
	history	historia
	education	kasvatustieteet
	psychology	psykologia
	sociology	sosiologia
	other:_____	jokin muu, mikä:_____

Professional profile of a forestry graduate
Valmistuneen metsänhoitajan ammatilliset taidot

Please judge the importance of the following key competences a university graduate of forestry of the year 2010 should have. Judge the competences for the level of a Bachelor's and a Master's degree separately.

Arvioi seuraavien kykyjen ja taitojen tärkeys metsänhoitajan ammatissa vuonna 2010. Arvioi kykyjen ja taitojen tärkeys erikseen alemmalle (Barchelor taso) ja ylemmälle (maisterin tutkinto) yliopistotutkinnolle.

1. Importance in the area of general competences:
Yleisten taitojen tärkeys:

Please use the following scaling of importance:
1 = none; 2 = weak; 3 = considerable; 4 = strong
Käytä vastauksissa seuraavaa numerointia:
Tärkeys: 1 = olematon; 2 = vähäinen; 3 = huomattava; 4 = vahva.

Bachelor's Level *Alempi Tutkinto*	Master's Level *Maisterin Tutkinto*	English	Finnish
		Capacity for analysis and synthesis	Taito analysoida ja yhdistellä tietoa
		Capacity for applying knowledge in practice	Taito soveltaa tietoa käytännössä
		Planning and time management	Taito suunnitella ja hallita ajankäyttö
		Basic general knowledge in the field of study	Perustiedot metsäalasta
		Grounding in basic knowledge of the profession	Ammatillinen käytännön pohjatieto metsäalalta
		Oral and written communication in your native language	Suullinen ja kirjallinen viestintä äidinkielellä
		Knowledge of a second language	Ensimmäisen vieraan kielen taito
		Elementary computing skills	Tietokoneen käyttötaidon alkeet
		Research skills	Tutkimustaidot
		Capacity to learn	Oppimisvalmiudet
		Information management skills	Informaation käsittelytaidot (kyky hankkia ja analysoida eri lähteistä saatua informaatiota)
		Critical and self-critical abilities	Kriittisyys ja kyky itsekriittisyyteen
		Capacity to adapt to new situations	Valmius sopeutua uusiin tilanteisiin
		Capacity for generating new ideas (creativity)	Kyky uusien ideoiden kehittämiseen (luovuus)

		Problem solving	Ongelmaratkaisukyky
		Decision-making	Päätöstentekokyky
		Teamwork	Ryhmätyökyky
		Interpersonal skills	Vuorovaikutustaidot
		Leadership skills	Johtamistaidot
		Ability to work in an interdisciplinary team	Kyky työskennellä monen alan ihmisten ryhmässä
		Ability to communicate with non-experts (in the field)	Kyky kommunikoida muiden kuin alan asiantuntijoiden kanssa
		Appreciation of diversity and multiculturality	Erilaisuuden ja monikulttuurisuuden kunnioittaminen
		Ability to work in an international context	Kyky työskennellä kansainvälisessä ympäristössä
		Understanding of cultures and customs of other countries	Muiden maiden kulttuurin ja tapojen ymmärtäminen
		Ability to work autonomously	Kyky itsenäiseen työskentelyyn
		Project design and management	Projektin suunnittelu ja hallinnointi
		Initiative and entrepreneurial spirit	Aloitteellinen ja yritteliäs asenne
		Ethical commitment	Eettinen sitoutuminen
		Concern for quality	Laatutietoisuus
		Will to succeed	Halu menestyä
		Other:	Jokin muu, mikä:

Please rank below the five most important competences for graduates according to your opinion. Please write the number of the item within the box. Mark in the first box the most important, in the second box the second most important and so on.

Merkitse yllä olevista mielestäsi viisi tärkeintä kykyä tai taitoa tärkeysjärjestykseen. Kirjoita kyseisen taidon numero ruutuun. Merkitse ensimmäiseen ruutuun mielestäsi tärkein ja seuraavaan toiseksi tärkein ja niin edelleen.

Bachelor's Level *Alempi Tutkinto*	Master's Level *Maisterin Tutkinto*	Skill number *Taito numero*
		1
		2
		3
		4
		5

Comment/*Kommenttisi*:

2. Importance in the area of subject-related competences (missing competences may be added)
Ammatillisen osaamisen tärkeys

Please judge the importance of the following subject-related competences a university graduate of forestry of the year 2010 should have. Judge the competences for the level of a Bachelor's and a Master's degree separately.

Arvioi seuraavien aihealueiden osaamisen tärkeys metsänhoitajan ammatissa vuonna 2010. Arvioi tärkeys erikseen alemmalle (Barchelor taso) ja ylemmälle (maisterin tutkinto) yliopistotutkinnolle.

Please use the following scaling of importance:
1 = none; 2 = weak; 3 = considerable; 4 = strong

Käytä vastauksissa seuraavaa numerointia:
Tärkeys: 1 = olematon; 2 = vähäinen; 3 = huomattava; 4 = vahva.

(This list is based on the classification by CABI, http://www.cabi-publishing.org/SubjectDisplay.asp?subjectarea=Pla&subject=Forestry, and was enlarged with the assistance of several experts adding missing relevant topics)

Bachelor's Level *Alempi Tutkinto*	Master's Level *Maisterin Tutkinto*	**English**	**Finnish**
		Silviculture	Metsänhoito
		Mensuration and inventories	Metsänmittaus ja inventointi
		Modelling of forest resources	Metsävarojen mallintaminen
		Forest management	Metsäsuunnittelu
		Forest policy	Metsäpolitiikka
		Forest economics	Metsäekonomia
		Forest ecology	Metsäekologia
		Forest law	Metsälainsäädäntö
		Ecosystem analysis and modelling	Ekosysteemianalyysi ja mallintaminen
		Agroforestry systems, farm forestry and other types of land use	Peltometsäviljely, maatilametsätalous ja muu integroitu maankäyttö
		Non-wood forest products	Metsän ei-puuaineiset tuotteet
		Biology of forest trees	Metsäpuiden biologia
		Genetics, breeding and biotechnology	Genetiikka, jalostus ja bioteknologia
		Climate aspects	Ilmastotekijät
		Soil aspects	Maaperätekijät
		Forest fire	Metsäpalot
		Forest health	Metsän terveys
		Wildlife ecology and management	Metsäeläin ekologia ja hoito
		Biodiversity	Monimuotoisuus
		Sustainable land-use management	Kestävä maankäytön suunnittelu

		Short rotation forestry	Lyhytkiertoviljely metsätaloudessa
		Tropical Forestry	Trooppinen metsätalous
		International Forestry	Kansainvälinen metsätalous
		European Forestry	Euroopan metsätalous
		Mountain forestry and protective forests	Vuoristometsätalous ja metsien suojelukäyttö
		Protection of forests	Metsänsuojelu
		Arboriculture	Yksittäisten puiden hoito
		Forest products and processing	Metsäteollisuustuotteet ja niiden jalostaminen
		Logging operations and technology	Puutavaran korjuu ja -teknologia
		Illegal logging and deforestation	Laittomat hakkuut ja metsien häviäminen
		Forest certification	Metsäsertifiointi
		Timber trade	Puutavaran kauppa
		Forest industry	Metsäteollisuus
		Fuel and energy	Puun energiakäyttö
		Environmental and service aspects	Metsien ympäristöhyödyt ja palvelut
		Community and urban forestry	Kylämetsätalous ja kaupunkimetsien hoito
		Sociological, cultural and related economic aspects	Sosiaaliset, kulttuuriset ja niihin rinnastettavat taloudelliset seikat
		Research and development: techniques and methodology	Tutkimus ja kehitys: tekniikat ja menetelmät
		Information systems, data management and services	Tietojärjestelmät, tiedon käsittely ja tietopalvelut
		Activities in teaching and education	Opetus ja koulutus
		Life-long learning and professional training	Elinikäinen oppiminen ja ammatillinen koulutus
		Forestry ethics and ethical codes of conduct in forestry	Metsien käytön etiikka

Please don't forget to give the following personal information:
Taustatiedot vastaajasta:

You are - you have/*Sinä olet – sinulla on*:

	Female/*Nainen*
	Male/*Mies*
	Finnish/*Suomalainen*
	Other nationality/*Muu kansalaisuus*
	forestry graduate/*Metsäalan koulutusta*
	Other profession/*muu koulutus*

You work/*Työskentelen*:

	In Finland/*Suomessa*
	Abroad/*Ulkomailla*
	In the field of forestry/*Metsäalalla*
	Outside the field of forestry/*Metsäalan ulkopuolella*
	At an institution offering forestry education (university, polytechnic, etc.)/ *Koulutusorganisaatiossa (yliopisto, polytechnicsammattikorkeakoulu, jne.)*
	At a forest research institute/*Metsäntutkimusorganisaatiossa*
	In a non-governmental organization/*Etujärjestössä*
	In consulting/ *Konsultointiorganisaatiossa*
	In a governmental organization (ministry, EU, etc.)/ *Kansalaisjärjestössä*
	In the wood-based industries/ Teollisuudessa
	Other, please specify:/ *Muu, missä:*

Thank you very much for your kind co-operation/*Kiitos yhteistyöstä!*

Appendix 4: Questionnaire 3 – Students' questionnaire

Background information

For the analysis of the results we will need some background information about you.

You are
○ female ● male

How old are you?
○ 18-19 years ○ 20-24 years ○ 25-29 years

● 30-34 years ○ 35 years or more

I started my forestry studies in the year

[ ]

I plan to graduate in the year

[ ]

Forestry is my first university degree
○ Yes ○ No

If forestry is not your first degree, what is the name of your first degree (in Finnish or English)?

I have

○   Finnish nationality   ○   another nationality

If you have another nationality than Finnish, which?

Where do you come from?

○   I grew up in a settlement with less than 500 people

○   I grew up in a settlement with between 500 and 5.000 people

○   I grew up in a settlement with between 5.000 and 10.000 people

○   I grew up in a settlement with between 10.000 and 50.000 people

○   I grew up in a settlement with between 50.000 and 100.000 people

○   I grew up in a settlement with more than 100.000 people

Motivation and satisfaction

We would like to ask a few questions about your motivations to study forestry and your satisfaction with your studies.

What was your main reason to study forestry? Please respond in one sentence!

I started to study forestry, because

Was forestry your first choice?

○   yes   ○   no

If you answered with no, what was your first choice?

[text box]

How satisfied are you with your forestry studies?

I am

○ extremely satisfied   ○ satisfied   ○ undecided

○ disappointed   ○ extremely disappointed

How satisfied are you with personal support (tutors, mentors) provided by the faculty (lecturers, tutors, mentors)?

I am

○ extremely satisfied   ○ satisfied   ○ undecided

○ disappointed   ○ extremely disappointed

Please select all the opinions below that you agree with:

I am disappointed, because

☐ I find the content of the forestry courses is not interesting

☐ Teaching quality is not as good as I expected

☐ Students are not properly supported by the faculty

☐ The university environment does not seem right for me

☐ I don't really seem to fit into the student group

☐ Chances to find a job are bad

☐ The studies are more difficult and time consuming than I imagined

☐ The studies are not challenging and rather too simple

☐ I cannot see that the skills I learn will be useful for me in the future

☐ There is no systematic progress in teaching

☐ The faculty does not take students' opinions seriously

Other comments

```
┌─────────────────────────────────────────┬─┐
│                                         │▲│
│                                         │ │
│                                         │ │
│                                         │▼│
├─────────────────────────────────────────┼─┤
│◄│                                    │►│   │
└─────────────────────────────────────────┴─┘
```

Have you ever considered to stop studying forestry to do something else?

○   Yes, quite often   ○   Yes, sometimes   ○   No, never

If you have considered to change your study subject, what could you imagine doing instead? Please answer in one sentence!

```
┌─────────────────────────────────────────┬─┐
│ If I stopped studying forestry, I would │▲│
│                                         │ │
│                                         │ │
│                                         │▼│
├─────────────────────────────────────────┼─┤
│◄│                                    │►│   │
└─────────────────────────────────────────┴─┘
```

Recent developments concerning university education

The so-called **Bologna Process** aims at harmonizing university degree programs in Europe. This means that there will be comparable **undergraduate** (MMK or Bachelor's), **graduate** (MMM or Master's) and **post-graduate** (MMT or PhD) **degrees** that will have to meet certain standards. The goal is to make European degrees transparent and comparable, increase mobility and to improve quality standards. **This also concerns forestry education at universities.**

We would like to hear **your opinion** about this process.

I have heard about the Bologna Process.

○   Yes   ○   No   ○   I am not sure

Do you think it is important to harmonize degrees on a European level?
I think it is

○   extremely important   ○   important   ○   not important   ○   I don't know

What do you think about the Bachelor (BSc) degree in forestry? Please tick all options that you agree with.
I think that the Bachelor degree

☐   shortens study times

☐   will increase competition between university and polytechnic graduates

☐   is not well accepted by employers at this point in time

☐   will help students to change universities or study fields more easily

☐   makes mobility within Europe easier

Have you considered to leave the university with only a Bachelor degree?

○   I have seriously considered it.   ○   I would consider it if I would get a job offer.

○   No, it is not an option for me.   ○   I don't know.

Comments about the Bachelor degree in forestry or the Bologna Process:

```
Comment:
```

Competences

During their studies students learn **subject-specific forestry competences** (e.g., silviculture or forest management) and so-called **generic competences** (e.g., teamwork or language skills).

*If you **think about all the courses you have taken so far** in your forestry studies, which importance do the **courses** give to the improvement of the following skills?*

Please click on the appropriate answer in the drop-down menu!

Importance of problem solving
○ strong   ○ considerable   ○ weak   ○ none

Importance of capacity to learn
○ strong   ○ considerable   ○ weak   ○ none

Importance of capacity for analysis and synthesis
○ strong   ○ considerable   ○ weak   ○ none

Importance of research skills
○ strong   ○ considerable   ○ weak   ○ none

Importance of ability to work in an interdisciplinary team
○ strong   ○ considerable   ○ weak   ○ none

Importance of ability to work autonomously

○ strong ○ considerable ○ weak ○ none

Importance of decision-making

○ strong ○ considerable ○ weak ○ none

Importance of basic general knowledge in forestry

○ strong ○ considerable ○ weak ○ none

Importance of information management skills

○ strong ○ considerable ○ weak ○ none

Importance of concern for quality

○ strong ○ considerable ○ weak ○ none

Importance of will to succeed

○ strong ○ considerable ○ weak ○ none

Importance of capacity for applying knowledge in practice

○ strong ○ considerable ○ weak ○ none

Importance of teamwork

○ strong ○ considerable ○ weak ○ none

Importance of ability to communicate with non-experts in the field

○ strong ○ considerable ○ weak ○ none

Importance of grounding in basic knowledge of the forestry profession

○ strong ○ considerable ○ weak ○ none

Importance of critical and self-critical abilities

○ strong ○ considerable ○ weak ○ none

Importance of capacity for generating new ideas (creativity)

○ strong ○ considerable ○ weak ○ none

Importance of interpersonal skills

○ strong ○ considerable ○ weak ○ none

Importance of computing skills

  ○ strong   ○ considerable   ○ weak   ○ none

Importance of capacity to adapt to new situations

  ○ ○ strong   ○ considerable   ○ weak   ○ none

Importance of leadership skills

  ○ strong   ○ considerable   ○ weak   ○ none

Importance of oral and written communication in native language

  ○ strong   ○ considerable   ○ weak   ○ none

Importance of ability to work in an international context

  ○ strong   ○ considerable   ○ weak   ○ none

Importance of project design and management

  ○ strong   ○ considerable   ○ weak   ○ none

Importance of ethical commitment

  ○ strong   ○ considerable   ○ weak   ○ none

Importance of planning and time-management

  ○ strong   ○ considerable   ○ weak   ○ none

Importance of knowledge of a foreign language

  ○ strong   ○ considerable   ○ weak   ○ none

Importance of appreciation of diversity and multiculturality

  ○ strong   ○ considerable   ○ weak   ○ none

Importance of understanding of customs and cultures of other countries

  ○ strong   ○ considerable   ○ weak   ○ none

Importance of initiative and entrepreneurial spirit

  ○ strong   ○ considerable   ○ weak   ○ none

Expertise in which of these competences will in your opinion be MOST IMPORTANT to find a job later?

- [ ] problem solving
- [ ] capacity to learn
- [ ] capacity for analysis and synthesis
- [ ] research skills
- [ ] ability to work in an interdisciplinary team
- [ ] ability to work autonomously
- [ ] decision-making
- [ ] information management skills
- [ ] basic general knowledge in forestry
- [ ] concern for quality
- [ ] will to succeed
- [ ] capacity for applying knowledge in practice
- [ ] teamwork
- [ ] ability to communicate with non-experts in the field
- [ ] grounding in basic knowledge of the forestry profession
- [ ] critical and self-critical abilities
- [ ] capacity for generating new ideas
- [ ] interpersonal skills
- [ ] computing skills
- [ ] capacity to adapt to new situations
- [ ] leadership
- [ ] oral and written communication in Finnish
- [ ] ability to work in an international context
- [ ] project design and management
- [ ] ethical commitment
- [ ] planning and time management
- [ ] knowledge of a foreign language

☐ appreciation of diversity and multiculturality

☐ understanding of cultures and customs of other countries

☐ initiative and entrepreneurial spirit

Comments:

The future of forestry studies at universities

Forestry education has difficulties to adapt to the challenges of a **changing labor market**. For graduates of university forestry programs there are no sure and easy options anymore to find employment. If forestry studies should remain attractive for students, adjustments of the study programs will have to be made in the future.

We would like to hear **which changes would make forestry studies more attractive to you. Please click on the appropriate answer in the drop-down menu!**

It would make forestry studies more attractive to me...

if the course content was more practically oriented

○ yes ○ no ○ I don't know

if I would learn more about traditional aspects of forestry (e.g., silviculture, forest management, mensuration, inventories)

○ yes ○ no ○ I don't know

if I would learn more about technological aspects (e.g., forest products and processing, logging operations and technology)

○ yes ○ no ○ I don't know

if I would learn more about economical aspects (e.g., forest industry, forest economics, timber trade)

○ yes ○ no ○ I don't know

if I would learn more about ecological aspects (e.g., ecosystem analysis & modelling, forest health, protection, biodiversity, wildlife ecology and management)

○ yes ○ no ○ I don't know

if I would learn more about social aspects (e.g., rural development, certification, ethics, recreation, illegal logging, urban forestry)

    ○   yes   ○   no   ○   I don't know

if I would learn more about international aspects (e.g., European and international forest policy, tropical forestry, forest fire, short rotation forestry)

    ○   yes   ○   no   ○   I don't know

if I would learn more about research aspects (research and development methods and technology)

    ○   yes   ○   no   ○   I don't know

if I would learn more about information systems (data management and services)

    ○   yes   ○   no   ○   I don't know

if I would learn more about biological aspects (such as, e.g., biology of species, genetics, breeding and bio technology, arboriculture)

    ○   yes   ○   no   ○   I don't know

if I would learn more about sustainable resource development aspects (e.g., fuel & energy, modelling of forest resources, sustainable land-use)

    ○   yes   ○   no   ○   I don't know

if I would learn more about educational aspects (e.g., teaching methods, information communication technology, life-long-learning)

    ○   yes   ○   no   ○   I don't know

Comments:

Attractiveness of future graduates of forestry

Expertise in which of these competences will in your opinion be MOST IMPORTANT to find a job later?

☐   Applied (practical) knowledge

☐   Traditional knowledge

☐   Technology knowledge

- ☐ Economic knowledge
- ☐ Ecological knowledge
- ☐ Sociological knowledge
- ☐ International forestry knowledge
- ☐ Language skills
- ☐ Research knowledge
- ☐ Biological knowledge
- ☐ Information services skills
- ☐ Computing skills
- ☐ Sustainability resource management knowledge
- ☐ Educational skills

Comments :

Appendix 5 – Student comments about the BSc (Q3)

This appendix presents qualitative comments made by the students in the comment boxes of questionnaire 3. Positive comments that were made on the BSc are given first:

- o "It is internationally recognized".
- o "It increases goal-orientation".
- o "The Bachelors degree divides studies in two, which I find good. I.e. you get a chance to look back and think is there an even better area to study".
- o "Graduating with a Bachelors degree enabled me to move to U.S. and continue here my graduate studies".
- o "It is a good choice for students who have difficulties. At least you can get some degree".

There was also some hope that the BSc-MSc system would offer increased opportunity for lifelong learning:

- o "Maybe there will be some kind of utility for a student if he/she gets a job where it is possible to do the master studies at the same time with the work".
- o "It allows you to have a degree and get a job, if for any reason you have to leave your studies".
- o "The Bachelor degree is just a start. In this developing society, we will always have to study and absorb knowledge".

There were rather negative comments on the Bologna Process from Finnish students, e.g.:

- o "The Bologna Process sucks in its outcome. We had this really good way of measuring work in weeks in Finland. Now there is some stupid 27,xx h/credit measurement, it makes no sense. And the only reason is that some influential person has decided that a degree is 300 credits and 5 years. Also the system seems to be pretty inflexible".
- o "The process itself is a good idea, but the pace has been too fast, too many difficulties in organizing new curriculums and too much administrative work for departments without help from the upper organization".

There were also doubts that the Bachelor degree would shorten study time (see also Table 23) and that employers would accept BSc graduates as employees. Especially Finnish students expected increasing competition between graduates of universities and universities of applied science (polytechnics):

- o "I think that it is difficult for employers to grasp the difference between Bachelor and Master degrees which can lead to "redundancy" of Masters degree if it does not make any difference in job market (of course for those who aim to the research and post graduate studies the situation is different)".
- o "The Bachelor degree in forestry increases competition in already over competed field of study and is going to minimize practical training possibilities. Graduates are not going to find jobs in the forestry sector or at their own professional competence level".
- o "In Finland, we have a high quality polytechnic education, so why would somebody want to hire bachelor rather than somebody who has degree from a polytechnic. They have much more knowledge about practice, which is important in work life".

While it was acknowledged by some that the BSc is internationally recognized and thus transferable degree, there were some doubts that the European BSc was really comparable to established BSc degrees:

- o "I think that the BSc makes sense within Europe, but a BSc from here is still very different from the BSc in USA/ Canada/ UK/ Australia etc.".

Frequently, it was felt that polytechnic students unfairly gained benefits due to the introduction of the BSc degree:

- o "Polytechnic graduates in forestry cannot be compared with university BSc-s due to less demanding studies in polytechnic".
- o "I hope that there is still a difference between university and polytechnic studies".
- o "I am quite concerned about the polytechnic bachelor – the university bachelor antithesis or confrontation. I think that it's not fair to call people who graduate from polytechnic as bachelors from

university students' point of view. Polytechnic students gain undeserved benefits from it".

It was rather expected that the BSc would result in hierarchical structures, as well as decrease flexibility and transparency. The breadth of forestry studies resulted in mixed feelings concerning the feasibility of a BSc degree:

- o "I think the Bachelor is good and if people say that it is not possible to learn in such a time enough about forestry they are wrong. I think you can learn any job pretty fast if you are interested in it. If you do 4 or 3 years does not matter. The only point is you have to do it for real and stay on your path. This is more important".
- o "Too broad topic I think. Hard to apply what we learn to practice".
- o "I believe the study time (i.e. 3 years) is adequate for a BSc providing that a comprehensive and up-to-date curriculum is continuously developed to keep students abreast of International developments. The Bologna Process … will not only enhance mobility across the continent but will also broaden the intellectual capability of the students to meet work place challenges and cultural dynamics after graduation".