

BACHELOR / MASTER EDUCATION IN
FOREST SCIENCES –
READY FOR THE NEXT DECADE?

Proceedings of the SILVA Network Conference
held at the Faculty of Forestry
University of Zagreb, Croatia
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Participants of the SILVA Network conference in Zagreb in 2010

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PREFACE

The 2010 SILVA Network annual meeting was organised by the Faculty of Forestry of the University of Zagreb, Croatia (June 17-19). This meeting was connected to the “ICA Week of Conferences 2010” which harboured assemblies of standing committees of the Association of European Life Science Universities (ICA) in which the President and the Secretary General of the SILVA Network participated.

We greatly appreciated the outstandingly efficient support of the local organisers of the SILVA Network meeting, particularly of Prof. Dr. Marijan Susnjar, who organised the meeting, and his colleagues Prof. Dr. Andrija Bogner and Prof. Dr. Milan Oršanić. It was an optimal way to introduce a university as a new member of the SILVA Network. Furthermore, we were very glad about the contributions of the International Forestry Students Association (IFSA) to the 2010 SILVA Network annual meeting. They underlined deficiencies between Bologna statements and reality, for instance concerning mobility and acknowledgement of ECTS credits from external courses. The SILVA Network is strongly interested in the improvement of learning and teaching processes. It is impossible to imagine this kind of discussions without students; they form an essential part here.

We were happy to welcome three new members of the SILVA Network, i.e. the hosting University of Zagreb, Faculty of Forestry, Croatia, the University of West Hungary, Faculty of Forestry, Sopron, Hungary, and the Istanbul University, Faculty of Forestry, Turkey.

Thanks also to the authors who submitted their papers and improved them during the review process initiated by the editors. Without the efforts of these authors, no proceedings would exist.

Gerhard Müller - Starck, Siegfried Lewark, Marijan Susnjar and Pieter Schmidt.
Editors

MINUTES OF THE GENERAL ASSEMBLY (GA) OF THE SILVA NETWORK 2010

Place: Faculty of Forestry, University of Zagreb, Croatia
Time: June 18th, 2010, 11:30 – 12:30

Constitution of the GA

With a total of 15 present institutions respectively transferred votes (votes had been transferred to S. Lewark, G. Müller-Starck and M. Ziesak) the GA is adequately constituted.

Decision about the acceptance of three new members

The three new member candidates are (listed in alphabetical order):

- Istanbul University, Faculty of Forestry, Turkey;
- University of West Hungary, Faculty of Forestry, Sopron, Hungary;
- University of Zagreb, Faculty of Forestry, Croatia.

With 15 “YES” votes the acceptance of these members was unanimously decided.

Proceedings

The proceedings of the SILVA Network Conference 2008 (held in Denmark) are available over the SILVA homepage respectively the homepage of the University of Eastern Finland. As only a very small number of printed copies is available, no copies can be distributed to authors. [Note: It is planned to prepare a second printing in Freiburg, so that all authors will have their personal copies.]

The contributions of the two SILVA Network conferences 2009 (Thessaloniki) and 2010 (Zagreb) will be published in one proceedings booklet. All authors of the 2010 conference are requested to send an article version about their presentation by September 2010 to Pieter Schmidt ineke_schmidt@hetnet.nl.

SILVA Network conference 2011

The next year's conference will be held in St. Petersburg, Russia.

As possible topics the following suggestions were mentioned:

- Mobility concerns in forestry education (students & teachers);
- The third cycle – PhD education in forestry;
- Quality aspects in forestry education.

A final decision on the conference topic will be taken later.

SILVA team beyond 2011

Candidates to follow the current SILVA President and Secretary General are not yet known. An additional advisory board according to earlier practice could be very helpful (to be nominated in 2011).

Membership fees

Also in the next year, membership fees in the SILVA Network will not be charged.

July 8th, 2010

Gerhard Müller-Starck and Martin Ziesak

(President of the SILVA Network and Secretary General)

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SUMMARY

BACHELOR/MASTER EDUCATION IN FOREST SCIENCES – READY FOR THE NEXT DECADE?

PIETER SCHMIDT

In his introduction, Gerhard Müller-Starck stated that this meeting, thirteen years after the Bologna Declaration, is a good moment to evaluate the developments in forestry and forest sciences education at universities in Europe since then, including the Bologna process. Are universities content with the BSc and MSc programmes they are offering now, based on the Bologna principles? Are the students content with the workload and the teaching and learning concepts in the new curricula? Are the employers, when engaging the new BSc and MSc graduates, content with their quality, competences and skills? The contributions to these proceedings address these issues.

Four universities from various countries in Europe presented their experiences with developing, offering – both to students and labour market – and running the new, two cycle study programmes in forestry and forest sciences. One university presents the situation in all three cycles, with an emphasis on the last one.

In his contribution on the situation at the Faculty of Forestry and Wood Sciences (Czech University of Life Sciences, Prague), Jiří Viewegh does not see any positive aspects for the new concept. This concept was forcibly implanted by EU bureaucracy instead of a long-time (since 19 century) well-established education system. It is almost impossible to educate specialists in forestry and wood processing during bachelor studies. Then, all students pass into the master level. Out of those difficulties moreover society problems arise. Although many firms started to take bachelor graduates, society as a whole does not consider bachelor education as a full-featured university education. The faculty decided to return to the traditional curricula.

In his description of the new curricula at the Technical University of Madrid, Spain, Fernando García Robredo displays a more positive view. He sees the Bologna Process as a huge opportunity to harmonize higher education across Europe. This process, aiming at enhancing employability and mobility of citizens to increase the international competitiveness of Europe through the creation of the European Higher Education Area (EHEA), is being followed in different ways and at different paces, depending on the country. Garcia Robredo describes in detail the political and administrative steps taken by the Spanish government to formulate the university regulations for the new study programmes. Then he describes the new BSc and MSc curricula for Forestry offered by the School of Forest Engineering of

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the Universidad Politécnica de Madrid. However, no data are yet available on the results.

Although the labour market situation in Austria is comparable to the one in the Czech Republic, being very difficult for BSc graduates to find a job, all curricula of the University of Natural Resources and Life Sciences Vienna (BOKU), including the former diploma studies in forestry were converted to the Bachelor/Master system in 2004. For the higher ranking positions in forestry either a diploma from a professional high school or a graduation at master level from BOKU and (in both cases) a state examination after three years of practical experience in a forest enterprise is necessary; the first leading to the profession of a forest engineer and the latter to that of a forest manager ("Forstwirt" in Austria), each with different authorizations. The Bachelor graduates are now allowed to enter this system, but only at the forest engineer level, a way which is not used in practice. One difficulty is that employability can hardly be reached for bachelor graduates in forestry. Excessive flexibility concerning admission of Bachelor graduates from other natural sciences or technical studies to the forestry master curriculum posed another problem of an inappropriate knowledge basis of some of these students. Based on the experiences BOKU developed "model curricula" for Bachelor and Master programmes. The adaptation of nine Bachelor studies and 26 Master studies to these model curricula is presently on its way.

Pia Böhnke describes the new BSc programme at the Technische Universität Dresden, Faculty of Forest, Geo and Hydro Sciences in Tharandt in Germany. In summer 2010, the first batch of 42 students graduated from this programme. Unfortunately, no data of their success on the labour market are available yet. Both university and the teachers have a predominantly positive impression, but identified three problem areas. Interdisciplinary courses improved content and teaching methods, but are very time consuming in planning. Both students and teachers experienced the examination load as too heavy. Moreover a time slot for mobility was missing, making student's mobility more difficult.

At the Technische Universität München (TUM), Germany, the Centre of Life and Food Science is responsible for among others the education in forest sciences. This Centre is organised in a matrix structure, which means that it is sub-structured in schools and research departments, a unique constellation which is expected to supply substantial synergistic effects in both research and teaching. Gerhard Müller-Starck presents here a new initiative which may substantially improve the situation of PhD (Bologna cycle 3) students. A system of rewarding academic activities of PhD students is expected to efficiently increase abilities and experiences of young scientists in conducting their research programme, in efficiently presenting the results of their research and improving their communication with colleagues. Various educational and "structuring elements" help to assure quality standards. It is noted that a better connection between Bologna cycles 2 and 3 programmes can

be looked at as a very efficient way for reducing the period until acquiring doctoral degrees and increasing the quality of PhD student programmes.

The Faculty of Forestry at the University of West-Hungary at Sopron, Hungary has a long tradition. Its predecessor, according to Ferenc Lakatos, was established more than 200 years ago. These 200 years are characterized by continuous changes: Relocation from Selmechánya/Banska Stiavnica to Sopron, reconstruction of the university structure (first a university aimed at mining, metallurgy and forestry, than at forestry only, followed by a forestry and wood technology university, and finally one faculty in the frame of University of West Hungary). The Faculty of Forestry offers now five study programmes: Forestry (five years undivided MSc), Environmental Engineering, Environmental Sciences, Nature Conservation and Wildlife Management (all BSc and MSc). The faculty has two doctoral schools (Forest and Wildlife Management Sciences, Environmental Sciences).

As already mentioned above, students' mobility is one of the main objectives of the Bologna Declaration. It seems, however, that in many new BSc-MSc programmes, this mobility is reduced due to various reasons. Reiner Mühsiegl describes an incentive to improve this mobility developed by the Faculty of Forest and Environmental Sciences of the University of Freiburg, Germany, in the frame work of the DAAD Programme "BACHELOR PLUS". Forestry students of this university can study one year in Canadian universities with funding from DAAD. This year may be acknowledged for a subsequent Master study programme, which thus may be shortened to one year. Seven students each year can be enrolled.

The problem oriented course "Global Challenges in Local Context" is part of the Erasmus Mundus international MSc programme European Forestry. The aim of this course is to develop students' understanding of the current challenges facing the forestry sector at local and global levels, as well as the fundamental relationships between global and local actions. Javier Arevalo evaluated the course, first describing the concept of this course and the experiences in its delivery with special attention to student's experiences. The latter proved to be enthusiastic about this student-led collaborative approach - with students drawing upon their diverse background and experiences and driving their interaction with various experts. The general conclusion of this paper is mentioned here: Because little attention is paid by educational scientists to the comparatively small field of forestry, a greater focus of forest faculties on the development of forestry education will be needed.

In his concluding remarks, Gerhard Müller-Starck could not unequivocally answer the question which is the title of this meeting. There is no doubt that education in forest science needs to be improved. The vivid discussions during this meeting supplied good reasons to be optimistic as the already existing cooperation between higher education institutions increases, as teachers and students together are involved in curriculum development, as mobility aspects are seriously taken into

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account, and if chances at the job market have a much higher priority than in the past.

This SILVA Network conference particularly addressed the benefits and drawbacks of the Bologna Process started in 1999, and demonstrated its uneven and often inconsistent realisation by European higher education institutions. It is possibly a wider problem, exemplified here for forestry and forest science education. Obviously, the intention of the Bologna Declaration is far from being accepted in a congruent way. This development affects student mobility and may also affect the chances of the graduates at the job market. The contributions to this meeting and the discussions pointed out ways to solve problems but this seems to be a permanent task – a good opportunity for the next meeting of the SILVA Network.

INTRODUCTION

BACHELOR/MASTER EDUCATION IN FOREST SCIENCES – READY FOR THE NEXT DECADE?

GERHARD MÜLLER - STARCK

Curriculum development in forestry related higher education has been a major topic of most of the annual conferences of the SILVA Network. Modifications of curricula already occurred before the Bologna Declaration (1999), but this event induced a drastic change. The classical national degrees (Diploma, Diplom, Engineer, Ingenieur, etc.) were replaced successively by the Bachelor degree for the first study cycle (BSc) and the Master degree for the second one (MSc). One major objective of the Bologna Process is to facilitate mobility by providing a European Credit Transfer and Accumulation System (ECTS) and thus by ensuring, that periods of study abroad can be and are acknowledged. As a consequence of the Bergen Declaration (2005), the BSc requires 180-240 ECTS credits, and the MSc 90-120 ECTS credits, with a minimum of 60 ECTS for the Master thesis. This frame is an essential element of the European Higher Education Area (EHEA) which was officially launched by the “Budapest-Vienna Declaration” in 2010.

The countries of the European Union ratified the Bologna Declaration during the years after 1999 and adapted their laws on university education. Some European countries from outside the European Union joined the Declaration already in 1999 or later and adapted their laws and regulations too. Universities in all these countries initiated the process of changing their curricula and offering the new ones to the student market. The first BSc/MSc modelled programmes started already at the end of the 20th century. This means that the first generations of students from these curricula have found their way to the labour market.

A little more than ten years after the Bologna Declaration, the 2010 conference of the SILVA Network in Zagreb is focusing on the variety of realisations of diverse elements of the Bologna Process at European universities by presenting and discussing case studies. Both teachers and students were invited to present their cases and give their view. Are universities content with the programmes they are offering now? Are the students content with the workload and with the teaching and learning concepts? Are the employers, engaging the new graduates, content with the results? These and other questions are addressed below. A subject fitting to the SILVA Network.

QUO VADIS ERUDITIO SILVARUM?

JIŘÍ VIEWEGH

Abstract

The former curricula of the Faculty of Forestry and Wood Sciences (Czech University of Life Sciences, Prague) study system are compared with the ones which followed the Bologna declaration 7 years ago. Unfortunately, there are no positive perspectives. The system was forcibly implanted by EU bureaucracy instead of a long-time (since 19 century) well-established education system. It is almost impossible to educate specialists in forestry and wood processing during bachelor level. Then, all students pass into the master level. Out of those difficulties, moreover society problems arise. Although many firms started to take bachelor level education graduates, society as a whole do not consider bachelor level as the full-featured university education.

Key words: Bologna declaration, Forestry university education, EU commission bureaucracy useless implant

Introduction

The title of this article is taken purposely from the well known Sienkiewicz's novel (1895). It describes the decadence of the Roman Empire with a newly reborn movement – Christianity, which offered the hope for a better society. This contribution will unfortunately deal with the decadence in university forest education.

Initially, the author would like to call your attention to the fact that he is not a Euro-sceptic, but maybe he naively believes that an educational system can actually educate and not substitute a social system.

During this year, ten years have elapsed since the Bologna declaration principles were started to apply to university forestry education. The Faculty of Forestry and Wood Sciences of the Czech University of Life Sciences, Prague, started to use this system seven years ago. Primary problems were taken then as initial inexperience. However, it is now possible to assess the position after seven years more objectively.

Traditional higher education in forest science in the Czech Republic

Since 1919 university forestry study in the Czech Republic had a length of a five year. The exceptions are:

- during the occupation of Czechoslovakia, from 1939 to 1945, when all universities were closed by Nazi Germany;
- in 1962 - the Forestry Faculty in Prague was closed administratively by the Government and it was re-established as late as 1990;
- at the beginning of the eighties, when some communist leaders thought to shorten forestry studies to four years. This four years study programme proved to be very bad, so it was extended to four and a half years. Even that was considered unsuitable, so it was reverted back to five years.

Since 1990 the length of university forestry study at the Forestry Faculty in Prague was five years. Curricula were designed to offer all necessary basic subjects in the first two years. These subjects would be continuing in the form of specialized forestry subjects later. Primarily subjects were: mathematics, physics, chemistry, general botany, plant physiology, systematic botany, bioclimatology, dendrology, geology, and soil science. After the third year, education in specialized subjects began with phytosociology and classification of forest plant communities, continuing with seed and nursery management plus silviculture on one hand, forest management including mensuration on the other, followed by the technical part with engineering, forestry machinery and felling, which later were transformed to economic results including forest valuation.

Forestry is known as a very wide specialization. It covers forestry specialized botany, dendrology, zoology and entomology. Soil science with specialization relating to forest soils has to be based on some knowledge of geology. Also the basic knowledge of economics and - of course - techniques is needed. A forester must know the principles and methods of surveying, cartography and photogrammetry. These subjects were lectured during the first half of the study – five semesters. Forestry specialized subjects in these fields were taught too.

Approximately after this two-and-a-half year study, most of the students knew, what could be the path to their Diploma (Master's) Thesis, aimed at either biological, economical or technical subjects inside the wide frame of forestry. The second half of the study, again five semesters, covered subjects specialised forestry subjects (e.g. silviculture in its varied steps; forest mensuration; forest management; forest protection including pest control, fungal diseases, wind and snow breaks; forest economics; forest harvesting and timber transport including an economic and environmental impacts etc.). Next to these courses, students had two vegetation seasons to collect data, which fully enabled them to prepare their Thesis at a high level. Moreover, alumni in the leading positions in practical forestry and often in other bio-technical specializations were invited to give a lecture, due to their wide scope of knowledge.

Current problems of the Bachelor and Master education

Bachelor degree

Seven years ago, the Czech Ministry of Education orientated all universities to change their study programmes to bachelor and master degrees, with the exception of medicine, veterinary and law faculties. Hence, it was necessary to change all study programmes. With the idea, that the student graduating with a bachelor degree does not need to continue, and that he will be recognized as a specialist.

This has meant a strong reduction in the content of basic subjects or the need to cancel them. Physics has been cancelled and mathematics and chemistry lectures have been reduced, e.g. The Bachelor curriculum has been supplemented by a very soft education of seed and nursery management plus silviculture, restricted to one semester, and also engineering, forestry machinery and felling. The old forestry curriculum had to be reduced to six semesters. Moreover, it was decided that the last semester should be shortened in order to deal with exams, the necessary time to prepare for them, and in order to complete the Bachelor's thesis and allow necessary time for graduate exams preparation. It is supposed of his continuing in a master curriculum, where students will extend their knowledge of all "reduced" specialized subjects.

Such a - to six semesters - reduced forestry curriculum does not substitute the knowledge of alumni of specialized professional (secondary level) forestry schools with four years curricula. It is a question if, when it is not a superstructure of that professional one, the bachelor's degree is a university education degree at all in the sense of the historical European education system. Maybe it is an incorrect understanding of the American term "High School" in respect of secondary (professional) school degrees interpreted by the bureaucracy in the EU Commission.

Many forestry faculties in Europe have adapted to a situation (forced by their governments) by dividing their Bachelor curricula to specialized programmes – biological branch, economical branch, technical branch or their combination bio-economical, bio-technical, etc. (Viewegh, 2011). Thus, instead of a widely educated forest manager, there evolves in the case of specialized forestry Bachelor curricula a narrowly specialized alumnus. In the case of an undivided Bachelor curriculum a half-educated forester (not a forest manager) graduates. Both cases are bad for the forestry profession and also for employment of the alumni. While formerly a five years educated forest manager has had a wide knowledge to apply in respect of multi-functionality of forestry (industry), the present bachelor alumnus graduated after six semesters (three years) either will have (maybe) an encyclopaedic knowledge of the former manager or the owner will have to employ more specialized alumni to cover the whole the scope of the forestry (industry).

Next problems arise for the Bachelor's thesis. Their level is mostly rather low, since students are introduced to forestry specialized subjects only in Year 2 of the curriculum, often in Year 3. Thus, if they want to collect their own data, they have just one vegetation season for it, without the chance of complete measurements. Compare that with the forestry education at a secondary (professional) forestry school, where they have already some information in specialized forestry subjects as the basis for the choice of a thesis subject, which is situated in the 3rd study year. Hence, quite a lot of the Bachelor's theses cover supporting forestry subjects, e.g. dendrology, tree physiology etc. And, if a student wants to continue for a Master degree, the supervisor quite often allows writing the Bachelor's thesis as the theoretical preparation for the Master's one, with only a very small volume of collected data.

A student graduates at this stage (Degree Bachelor) and can either follow on by continuing a Master degree of the same specialization, which is required from the point of his knowledge in specialization or he can finish his study and try his luck on the labour market. He may want to be employed as a Bachelor of Forestry but his knowledge is not complete. During the vegetation season between the examination for the Bachelor degree and the possible start of a Master study, students mostly choose for their own activities, although it would be useful to work on their future Master's thesis by the next data collecting at least.

Master degree

Continuing the study in the same specialization could be ideal and (maybe) even originally intended. Of course, successfully passing the entry examination, covering specialized subjects of the previous forestry study (but not identical of the Bachelor state exams), is the prerequisite. It can happen that not only forestry bachelor alumni, who passed their entry exam, enrol for a Master degree. It is impossible to prepare such perfect test, covering all important facts of the Bachelor degree, without speaking about the supporting subjects. Although these students are able to graduate, they do not have a detailed base.

They have one vegetation season only for data collection to prepare their Master's thesis. Mostly students could use and develop their own Bachelor data. This - unfortunately - is not mandatory, so some students prepare their Master's thesis in quite differently subject, of their Bachelor's one. Is this the way to do it?

The Master study of forestry could be the highest specialized education in forestry practice. However, this is problematic in the case of students without a bachelor specialized base.

Students' mobility

Higher students' mobility during the study belongs to the declared advantages of the Bologna process. The data of the last three years show a converse development:

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the number of exchange students (both degrees) decreases - 2010 – 8 students; 2009 – 12 students and 2008 – 26 students.

The choice of the subjects to be studied in other faculties and in the lectured language is the next greatest problem. Most forestry curricula are only in a small way comparable, especially when numerous faculties have divided former classical forestry curricula to individual specializations (due to reasons, which are above mentioned). Almost all forestry faculties (including other university level institutions, with different names) teach in their mother tongue. The subjects offered in English are a better bargain. And even then, the subjects studied there are not similar to the profile subjects at the Czech mother university. This means students have to graduate profile subjects in their mother faculty and thus prolong their study time: e.g. all students, who partake in ERASMUS programmes, study four years for their Bachelor degree instead of three and in the case of Master study three years instead of two (Viewegh – personal job experience as the Vice Dean for pedagogical matters).

Concluding remarks

All these disadvantages of our European university unification lead to a definite degradation in university education in many specializations, including forestry (Liessmann, 2008). Maybe, a Bachelor degree functions in countries with a lack of secondary (professional or vocational) specialized education schools. Otherwise it is a senseless and complicated re-structuring of university education. Its sense and political proclamations occur in attractive statistics about the proportion of the university educated population. This leads to a lack of scientific education in the universities and its modification to specialized secondary education (e.g. Bachelor's thesis quality).

A chance to study for a Master degree without any previous Bachelor degree of relevant specializations is a strange type of “study tourism”, which could be a dream of students' mobility promoters. Such students will have a scant knowledge of two specializations, but without a deep knowledge of either.

A massive increasing university educated population through a Bachelor degree namely leads to absolute degradation of university education, which has been not only the cream of specialization, but it has formed the intellectual elite of the population. “Production” of forest specialists instead of one universal university educated forester with a wide horizon and the possibility of better understanding the consequences in forestry, leads to the artificial over-employment of hardly communicating specialists!

Forestry as a science will erode and its role will be taken over by separated narrow specialists in different fields, who will not communicate among themselves and will fight strongly against each other, as can be seen now, from the opinion

inconsistency on forest commercial ecosystems among nature protectors, economists and technicians.

A five year university education is more beneficial to students in Central Europe than the new three year Bachelor years study followed by a two year Master one. For over 100 years there has been a common belief that university education should comprise not less than five years. Medicine of course needs six. The common man believes that five years is essential for university education and anything less is inadequate. Due to this unacceptable change some people believe that if students finish having completed their Bachelor degree, they do not have the same standard of education, and this causes social problems.

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NEW FORESTRY CURRICULA AT THE TECHNICAL UNIVERSITY OF MADRID

FERNANDO GARCÍA ROBREDO

Abstract

Although the Bologna Process has aroused some resistance in several countries, it is proving to be a huge opportunity to harmonize higher education across Europe. This process, aiming at enhancing the employability and mobility of citizens to increase the international competitiveness of Europe through the creation of the European Higher Education Area (EHEA), is being followed in different ways and at different paces depending on the country.

This contribution intends to describe the adjustment of the Spanish University System to the EHEA and the consequences of this process for Forestry Studies. It also presents the new study programmes offered by the School of Forest Engineering of the “Universidad Politécnica de Madrid (U.P.M.)”, the oldest centre of higher forestry education in Spain. Finally, the expected outcomes of the new system are outlined.

Introduction

In Spain, as in many other European countries, there have been some protests and demonstrations against the Bologna Process. The perception of society about the changes caused by the creation of the European Higher Education Area (EHEA) has not always been positive. Some groups have seen the Bologna Process as a risk for public education and a threat to public universities, and have stood up shouting slogans such as “education is not a business”, “fight for a free education”, or “we don't want junk jobs”. A common fear is that the whole process leads to an increase in tuition fees.

Obviously, there is quite a lot of misinformation about the meaning of the reform. The objectives of the Bologna Process can be summarized as follows:

- *General objective:*
 - To enhance the employability and mobility of citizens and to increase the international competitiveness of Europe through the creation of the European Higher Education Area (EHEA) before 2010.
- *Specific objectives:*
 - To establish a common framework of readable and comparable degrees.
 - To implement a system based on two levels: Undergraduate and Graduate, structured along three cycles: Bachelor, Master and Doctorate. (Structure B-M-D).
 - To improve teacher's, student's and research mobility.
 - To set criteria and develop and employ methods for quality assurance.

The new EHEA will promote a European dimension of higher education.

Adjustment of the Spanish university system to the European higher education area

The adaptation of university studies to the European Higher Education Area provides an opportunity to fix the current deficiencies in the education for several disciplines and to modify the structures and curricula of the academic institutions in order to adapt to the new scenario. In Spain, the process of transition to the EHEA is moving somewhat behind schedule. The main milestones of the reform were as follows:

- Foundation of the National Agency for Quality Assessment and Accreditation (ANECA) in 2002. (Cabinet meeting agreement, 19th of July 2002).
- Framework Document (2003) establishing the integration of the Spanish University System in the European Higher Education Area regarding the following aspects:
 - ★ Improvement of transparency of studies.
 - ★ Quality Assurance System.
 - ★ Modification of the structure of the degrees.
- Royal Decree 1044/2003 establishing the procedure for the issuance of the European Diploma Supplement by the universities.
- Royal Decree 1124/2003 setting up the European Credit Transfer and Accumulation System (ECTS) and the grading system for official university degrees in Spain.
- Royal Decree 285/2004 by which the recognition and validation of foreign higher education degrees is regulated.
- Royal Decrees 55/2005 and 56/2005 by which university studies (both undergraduate and graduate) are regulated.
- Royal Decree 1393/2007 establishing the planning framework of official university studies.
- Ministerial Order CIN/324/2009 establishing the requirements for the verification of the official university degrees that entitle their graduates for the professional practice of short-cycle Forest Engineering (Ministry of Science and Innovation, 2009a).
- Ministerial Order CIN/326/2009 establishing the requirements for the verification of the official university degrees that entitle their graduates for the professional practice of long-cycle Forest Engineering (Ministry of Science and Innovation, 2009b).

In Spain the different branches of engineering are regulated professions, and the academic degree is linked to professional qualification. Therefore, the public administration must make sure that the education and training obtained at the university qualifies their graduates for professional practice. The two last regulations of the list above are aiming at this objective and, with that purpose, they

establish a thorough list of competences that necessarily have to be acquired to become a professional forest engineer.

Structure of Undergraduate and Graduate Studies

The curriculum structure is being reformed to conform to the European Higher Education Area. The academic year 2010/11 will be the beginning of a new system within which three levels of studies will be offered: Bachelor's degree (four years, length of the programme), Master's degree (one or two years) and Doctoral degree (PhD, at least two additional years after the completion of a research-oriented Master's degree). The proposed structure for university studies in Spain is shown in Figure 1.

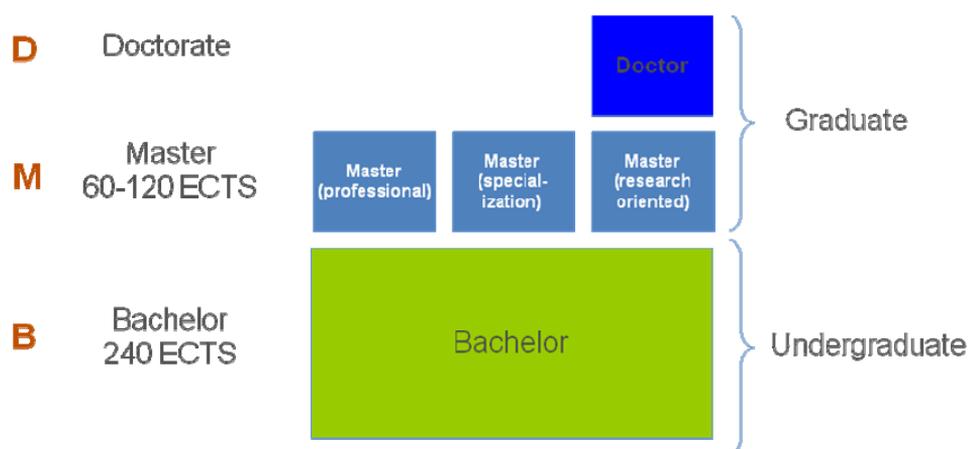


Figure 1: Structure of university studies in Spain based on three cycles (B-M-D).

Consequences of this process for forestry curricula

For the university system as a whole, some consequences can be expected from this transition from a system based mainly on teaching to one based mainly on learning. The Bologna reform provided the opportunity to update some of the old methods. Some of the differences between both systems are shown in Table 1.

Table 1. Methodological changes associated with the reform of university curricula.

Old system	New system
Based on teacher's activity.	Based on student's effort.
High number of lectures.	Lower number of lectures.
Most contents explained in the classroom.	The student must search references and go into the topics in depth.
Secondary role of the students in the learning process.	The student is the actor and not the passive object of the learning process.
Evaluation mainly based on tests.	Evaluation based on exams, essays, projects, classroom participation, ...

Consequences for university forestry curricula

In the old system, forestry curricula were structured on two levels: Short cycle forest engineering, which was a three year practically oriented degree, and long cycle forest engineering, a five or six year degree (depending on the university), providing a scientific education leading to a conceptual forest engineer.

After the completion of the long cycle forest engineering studies, the graduates could enrol in a doctorate programme leading to a doctoral degree awarded after at least three years of study and research, including the participation in courses, and the submission and defence of a PhD thesis.

In the new system, the structure of undergraduate and graduate studies must fit into the diagram depicted in Figure 1. Therefore, the adjustment of forestry curricula to the new system means new degrees (Bachelor in Forest and Wildland Engineering, Master of Forestry, ...), new study programmes, and a change in the length of the studies and the number of courses, as well as new methodologies based on students' effort (see Table 1).

The new degrees offered by the Technical University of Madrid are the following:

- Bachelor in Forest Engineering;
- Bachelor in Natural Environments Engineering;
- Master of Science in Forest Engineering.

The two bachelor degrees have a length of four years (240 ECTS). The Bachelor in Forest Engineering entitles their holders to the professional practice of short-cycle forest engineering. The holders of the Bachelor in Natural Environments Engineering acquire some relevant competences but are not qualified for the professional practice of forestry because this degree does not meet the specific requirements set by Ministerial Order CIN/324/2009 (Universidad Politécnica de Madrid, 2010c).

The Master of Science in Forest Engineering is a two year professional degree (120 ECTS) which meets the requirements set by Ministerial Order CIN/326/2009 and thus qualifies for the professional practice of long-cycle forest engineering. Direct access to this master's degree is only open to graduates coming from the Bachelor in Forest Engineering of the Technical University of Madrid. Graduates from other degrees have to take some courses to meet specific admission requirements.

The School of Forestry of the Technical University of Madrid offers some other master programmes which have a shorter length (60 ECTS or 90 ECTS) and a different orientation (specialization, research, ...).

According to the new system, the third cycle leads to the Doctor's degree, awarded after at least three years of study and research and the submission and defence of a doctoral thesis.

Table 2: BSc programme of Forest Engineering (list of courses by semester)

			BACHELOR'S DEGREE IN FOREST ENGINEERING		
			LIST OF COURSES BY SEMESTER		
		COURSE	Kind of course		
ECTS	FIRST YEAR	FIRST SEMESTER		Compulsory	
		6	Chemistry		
		6	Physics I		
		6	Mathematics I		
		6	Drawing for Engineers		
		6	Zoology and Forest Entomology		
	60	30	SECOND SEMESTER		Compulsory
			6	Mathematics II	
			6	Forest Botany	
			6	General and Firm Economics	
			5	Biochemistry and Biotechnology	
4			Physics II		
SECOND YEAR	60	30	THIRD SEMESTER		Compulsory
			6	Computer Science and Mathematical Modeling	
			6	Statistics	
			6	Plant Anatomy and Physiology	
			6	Soil Science and Climatology	
			3	Electrotechnics and Electrification	
	60	30	FOURTH SEMESTER		Compulsory
			7	Forest Ecology. Phytogeography	
			4	Forest Mensuration and Forest Inventory	
			4	Hydraulics	
			5	Construction	
THIRD YEAR	60	30	FIFTH SEMESTER		Compulsory
			6	Silviculture	
			4	Forest roads	

		Major A: Forest Ecology and Management: 6 Range Management and Agroforestry Systems 6 Forest Hydrology and Watershed Restoration 5 Forest Pathology and Pest Management 3 Forest Genetics Major B: Forest Products and Forest Industry: 5 Wood Anatomy and Wood Properties 5 Thermal Installations 5 Basic Operations in the Forest Industry 5 Industrial Electronics and Control Systems	Major A Major A Major A Major A Major B Major B Major B Major B
	30	SIXTH SEMESTER Major A: Forest Ecology and Management: 5 Parks and Gardens. Degraded Areas Reclamation 5 Game and Fish Management. Aquaculture 5 Afforestation & Nurseries 4 Landscape. Land Use Planning 7 Forest Management and Agricultural Valuation 4 Forest Fire Control Major B: Forest Products and Forest Industry: 5 Pulp and Paper Production 4 Wood Pathology and Conservation 5 Machines and Industrial Electric Swithgear Sets 5 Wood First and Second Transformation Processes 4 Non-Timber Forest Products Industry 7 Integrated Management Systems & Wood Industry Quality Control	Major A Major A Major A Major A Major A Major A Major B Major B Major B Major B Major B Major B
FOURTH YEAR	30	SEVENTH SEMESTER 6 English for Professional and Academic Communication Professional Training in Forest Sector Companies, Elective Courses, or International mobility (Socrates-Erasmus Programme)	Compulsory Elective
	60	EIGHTH SEMESTER 6 Forest Logging and Forest Certification 6 Law. Cadastre. Forest Policy and Sociology 6 Engineering Projects. Environmental Impact Assessment and Restoration 12 Bachelor's Final Project	Compulsory Compulsory Compulsory Compulsory

The study programmes of the two professional degrees (Bachelor in Forest Engineering and Master of Science in Forest Engineering) are described under the following heading in Tables 2 and 3.

New study programmes at the Madrid School of Forestry

Two new forestry programmes adapted to the EHEA are offered by the Technical University of Madrid: Bachelor in Forest Engineering and Master of Science in Forest Engineering. The course list for the new undergraduate study programme (BSc in Forest Engineering) is shown in Table 2. (Universidad Politécnica de Madrid, 2010a).

The study programme of the professional master's degree is shown in Table 3. (Universidad Politécnica de Madrid, 2010b).

There was a general feeling among graduates that most courses within the old Forestry curriculum were theoretically oriented, and more emphasis should be placed onto the practical aspects of Forestry. A more practice-oriented approach was demanded for several disciplines such as Business Administration and Finance, Economics, Project Design and Management, or Forest Management.

There was also a demand for the implementation within the Forestry curriculum of training periods in private companies or public agencies which could provide the students with practical learning experiences and the recognition of a certain number of credits. In the new study programme, the student can spend a whole semester in a private company or a public agency and obtain a maximum of 24 credits (Bachelor) or 30 credits (Master) for practical training. This will certainly contribute to strengthen the links with the professional world.

According to these requirements and those established by the Ministerial Order CIN/326/2009 aforementioned, the Master's degree consists of twenty compulsory courses structured in four modules: forest products industry, wildland resource planning, economics and business administration, and construction.

Table 3: MSc programme of Forest Engineering (List of courses by semester).



MÁSTER OF SCIENCE IN FOREST ENGINEERING				
LIST OF COURSES BY SEMESTER				
ECTS		COURSE	Kind of course	
FIRST YEAR 60	30	FIRST SEMESTER		
		4	Structural Design Projects	Compulsory
		5	Electrical Installations and Electrification Projects	Compulsory
		5	Pulp and Paper Technology	Compulsory
		3	Planning in Protected Natural Areas	Compulsory
		4	Land and Coastal Areas Management	Compulsory
		3	Forest Genetic Resources Conservation and Improvement	Compulsory
		3	Strategic Management	Compulsory
		3	Forest Management and Conservation International Strategies	Compulsory
	30	SECOND SEMESTER		
		3	Concrete Construction and Foundations	Compulsory
		5	Wood Technology and Processing	Compulsory
		4	Renewable Energy: Biomass	Compulsory
		4	Renewable Energy: Solar, Wind and Minihydroelectric	Compulsory
		3	Hydrological Planning and Combat against Desertification	Compulsory
3		Pollution Control in Natural Environments	Compulsory	
5		Financial Management	Compulsory	
3	Commercial Management and Marketing	Compulsory		
SECOND YEAR 60	30	THIRD SEMESTER		
		30	Professional Training in Forest Sector Companies, Elective Courses, or International mobility (Socrates-Erasmus Programme)	Elective
	30	FOURTH SEMESTER		
		4	Sustainable Management of Wildland and Mountain Areas	Compulsory
		3	Human Resources Management	Compulsory
		3	Forest Quality and Environmental Auditing Systems	Compulsory
		5	Wood Structural Projects	Compulsory
3	Elective course	Elective		
12	Master's Final Thesis	Compulsory		

Expected outcomes

Since the new system has not yet started to be implemented, there are not any actual data on expected results which can support sound conclusions on the performance of the system. Therefore, all the expected outcomes listed below are impressions, opinions and personal ideas not supported by actual data.

It is not evident that the comparability of forestry degrees from different European universities will be higher after the reform than it used to be before. The length of the curricula and the number of credits allocated to each discipline will be different. As a matter of fact, the comparability of forestry degrees within Spain will drop.

It must be acknowledged though that the transparency of the studies is increased as a consequence of the establishment of the European Diploma Supplement.

Regarding students' mobility, in the case of the School of Forestry of the Technical University of Madrid there is a huge uncertainty on inwards mobility since all the courses will be offered in Spanish and language is an important barrier. On the other hand, outwards mobility is expected to increase because the new study programmes encourage English communication skills and make credit recognition easier.

The effect of the new system on teachers' and researchers' mobility is unknown.

The new evaluation and assessment methodologies will require that professors carry out a detailed follow-up of the student's personal work. This implies a higher effort.

Students' workload will probably be higher than it used to be since the new system is more demanding in terms of dedication. It will become more difficult to combine work and study. This circumstance leads to a professionalization of the student, whose work hours will be the same as any other worker's.

Student achievement is unknown, but the academic performance is expected to go up and the dropout rate is expected to go down as a result of the implementation of new learning methodologies.

Graduates' employability is also unknown, since the traditional degrees are going to be replaced with the new ones and there is not any evidence regarding the acceptance of the new degrees by the market.

In Spain the implementation of the reform is being done at zero cost. In fact, during the last years less funding is available because of budget cuts. Therefore, the academic administrators must adapt to a whole new system but they are not getting the resources they need to be able to do it properly.

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EXPERIENCES OF THE UNIVERSITY OF NATURAL RESOURCES AND APPLIED LIFE SCIENCES (BOKU) IN THE BOLOGNA SYSTEM WITH SPECIAL REFERENCE TO STUDIES IN FORESTRY

MARTIN H. GERZABEK AND KARL STAMPFER

Abstract

All curricula of the University of Natural Resources and Life Sciences Vienna, including the former diploma-studies in forestry were converted to the Bachelor/Master system in 2004. For the higher ranking positions in forestry either a diploma from a professional high school or a graduation at the master level from our university and (in both cases) a state examination after three years of practical experience in a forest enterprise is necessary; the first leading to the profession of a forest engineer and the latter to that of a forest manager ("Forstwirt") with different authorizations each. The Bachelor graduates are now allowed to enter this system, but only at the forest engineer level, a way which is not used in practice. One difficulty is that employability can hardly be reached for bachelor graduates in forestry. Excessive flexibility concerning admission of Bachelor graduates from other natural sciences or technical studies to the forestry master curriculum posed another problem of an inappropriate knowledge basis of some of these students. Based on the experiences our university developed "model curricula" for Bachelor and Master programmes. The adaptation of our nine Bachelor studies and 26 Master studies to these model curricula is presently on its way.

Keywords: Bologna process, curricula in forestry, model curricula, professional qualification levels

Introduction

The University of Natural resources and Life Sciences Vienna (BOKU) was founded in 1872 as a small agricultural university with about 300 students. Today the university has closed to 11,000 students, a scientific staff of approximately 1200 people and a total staff of 2100 (headcounts). Teaching, research and administrative facilities are located throughout Vienna at 20 different sites. The yearly financial contribution through the general university fund is approximately € 100*106, external project funds amounted to € 32 *106 in 2010. The measurable output is more than 1000 graduates, around 2500 publications and 1200 presentations. Intensive co-operation exists with many countries and universities world wide, with emphasis on Africa, Asia, South America and Central/Eastern/Southeastern Europe.

At the beginning of this century our university offered diploma studies in forestry, agriculture, civil engineering and hydrology, landscape planning and food and

biotechnology. These studies had a minimum length of ten semesters, specialization was possible within the general study programme and the granted academic title was "Diplomingenieur" (Diploma Engineer, equivalent to the MSc). Doctoral programmes after the diploma studies had a length of four semesters.

Conversion to the Bologna system

Starting with the year 2003 and finally in 2004 all study programmes were converted to the Bachelor/Master system with a minimum length of six semesters for the bachelor and four semesters for the master. The minimum length of doctoral programmes was adjusted to the "European Doctorate" of six semesters. Nowadays our university offer nine Bachelor and 26 Master curricula and several doctoral and PhD programmes¹. Ten of the 26 master curricula are taught in English and seven of them are double degree programmes together with partner universities world wide.

Three bachelor curricula are relevant for the forest sector: Forestry, Wood and Fibre Technology, and Management of Environment and Bio Resources. The relevant master programmes are: Forest Sciences, Wood Technology and Management, Management of Environment and Bio Resources, Wildlife Ecology and Wildlife Management, Mountain Forestry, Mountain Risk Engineering and Material and Thermal Utilization of Renewable Raw Materials. An important point is that BOKU still grants the title "Diplomingenieur" for the master graduates as this title is prestigious in Austria and the German speaking world. International students can apply for the title "Master of Science" instead. Additionally, BOKU offers programmes in continuing education like: University Training for Hunting and Game Management.

To understand the difficulties encountered with the change to the Bologna system it is important to know the system of professional qualification levels in forestry in Austria. Figure 1 provides an overview of the present system.

In case of forestry it is important to take into account the professional needs for certain qualifications. For the higher ranking positions in forestry either a diploma from a professional high school or a graduation at the master level from our university and (in both cases) a state examination after three years of practical experience in a forest enterprise is necessary; the first leading to the profession of a forest engineer and the latter to that of a forest manager ("Forstwirt") with different authorizations each. The Bachelor graduates are now allowed to enter this system, but only at the forest engineer level.

As a matter of fact nobody uses the qualification scheme from Bachelor to forest engineer in practice.

¹ In Austria, there exists a slight difference between a doctoral programme and a PhD programme.

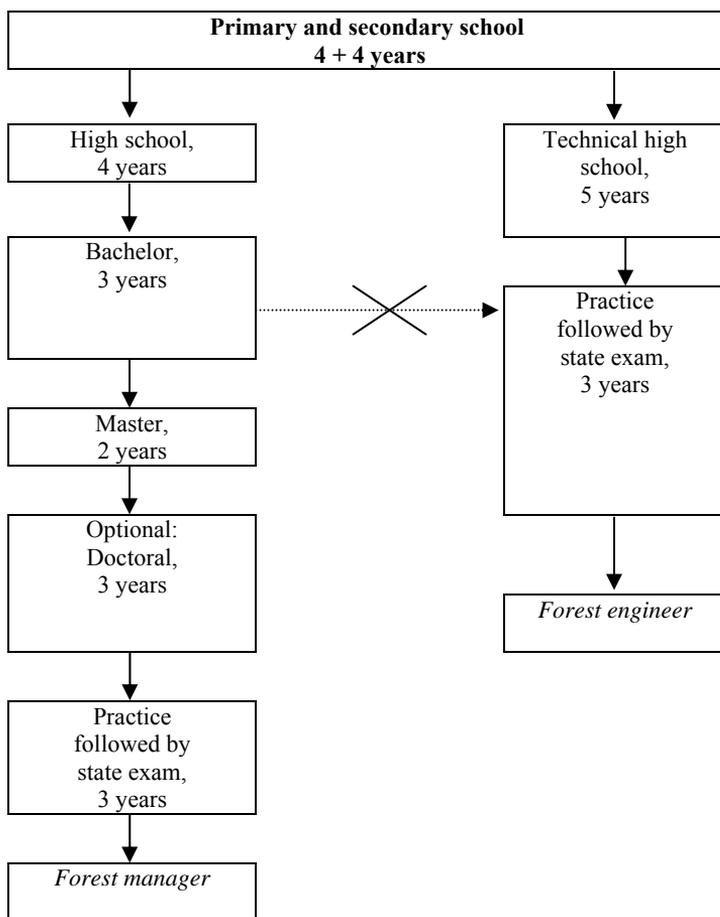


Figure 1. The road towards the two qualification levels Forest manager and Forest engineer in forestry in Austria. The theoretical pathway from bachelor towards forest engineer is in actual practice not used.

Experiences with the new Bologna system

The general difficulty we envisaged was the claim of politics to secure employability of the Bachelor graduates. One of the strength of the BOKU studies always was to offer a strong general background in natural, technical and socio-economical sciences during the first four semesters. BOKU tried to keep this principle to a certain extent. This implied that the employability is not reached for Bachelor graduates in all cases. Therefore, most of the Bachelor graduates go for a master study.

Another experience gained was the problems BOKU encountered with respect to the regulation of admissions to Master studies and the flexibility within the master studies. Our first decision was to aim at maximum flexibility in this respect, which led to some problems in Master courses within different curricula due to an

inappropriate knowledge basis of students and also at the labour market, as certain expectations of the employers were not met by the graduates.

Another important topic is the impact of the Bologna system on internationalization. At present we recognize that in general the Bologna system did actually not further foster the exchange of students between universities and countries at BOKU, which, however is and was on a high level. Specifically the six semester Bachelor curriculum does not give enough space for exchange semesters. The double degree Master studies, of course, offer opportunities for exchange at bits optimum.

Furthermore, the recognition of foreign programmes and or courses is not easy, as the curricula themselves are not harmonized (only in joint curricula).

Plans for the future

BOKU implemented a few years ago the project: „BOKU studies for the future“ under co-ordination of the senate. This project includes intensive discussions with colleagues from practice in so called „focus groups“. So, we were seeking practical guidance for the revision of curricula. Furthermore, we developed a general framework for the revision of curricula, conducted an international evaluation of the framework and adopted “model curricula” for Bachelor and Master programmes (Figures 2 and 3).

At present all curricula of BOKU are revised according to the model curricula.

Model curriculum – major cornerstones Bachelor

Clear qualification profile has to be stated.

Overall workload: 180 ECTS

Compulsory courses: minimum 150 ECTS, including
bachelor thesis: 12 ECTS;

practical experience: 3 ECTS;

Optional courses: maximum 20 ECTS;

Free chosen courses: maximum 18 ECTS;

Courses given in foreign languages (compulsory) 10 ECTS;

„Three pillar concept“: 25% natural sciences, 25% technical sciences and 25% social and economical sciences minimum in all Bachelor curricula.

Compulsory courses to be passed during the first two semesters: 15 ECTS.

Degree: Bachelor of Science.

Figure 2. Model curriculum: major cornerstones for all Bachelor of Science programmes.

Model curriculum – major cornerstones Master

Clear qualification profile (scientific vocational preparation).

Admission requirements: specific Bachelor programmes or proof of certain learning outcomes obtained in other programmes.

Overall work load: 120 ECTS, including

Compulsory courses: minimum 20 ECTS;

Master thesis: 30 ECTS;

Practical experience: 3 ECTS.

Optional courses: maximum 52 ECTS;

Free chosen courses: maximum 18. ECTS;

Courses given in foreign languages (compulsory): minimum 10 ECTS.

„Three pillar concept“: 15% natural sciences, 15% technical sciences and 15% social and economical sciences minimum in all Master curricula.

Academic degree: Diplomingenieur or Master of Science

Figure 3. Model curriculum: major cornerstones for all Master of Science programmes.

Conclusions

Cornerstones of the future development of studies at BOKU involve as priorities:

- to keep research directed teaching as basis of a high quality study programmes,
- the improvement of the supervision ratio in our curricula;
- the revision of the curricula taking into account stakeholder interests;
- additional doctoral schools to improve PhD education;
- additional offerings in continuous education (only in core areas of BOKU);
- additional efforts in quality management and didactics;
- in case of Bachelor programmes: definition of employment profiles and strengthening of basic sciences;
- in case of Master programmes: reduction of the number of master curricula; a high degree of modularization.

BOLOGNA IN THARANDT – EXPERIENCES OF SIX SEMESTERS DAY-TO-DAY BUSINESS

PIA BÖHNKE AND NORBERT WEBER

Abstract

In the year 2010, the Department of Forest Sciences of Technische Universität Dresden at Tharandt disposes of four years of experience in the implementation of the Bologna system. The Bachelor of Forest Sciences has been established successfully. In principle, the former decision to change teaching contents as well as teaching methods fundamentally, proved to be right. However, some difficulties become obvious. To these belong, amongst others, an enormous administrative burden in multi- and interdisciplinary modules for lecturers and supporting staff and a great many of examinations for students. In addition to the Bachelor of Forest Sciences, four Master programmes are offered. As one of these, in 2009 the new Master programme in Forest Sciences was launched.

The Department of Forest Sciences of the Technische Universität Dresden today

The Department of Forest Sciences of Technische Universität Dresden is located in the city of Tharandt. It belongs to the Faculty of Forest, Geo- und Hydro Sciences and consists of nine institutes which employ altogether 20 University professors and lecturers. The department offers a wide range of subjects ranging from natural sciences over social sciences to technical sciences. In 2010 around 800 students were enrolled in five different forestry related study programmes. The fundament of academic forest education in Tharandt is the Bachelor Programme of Forest Sciences. Master students can choose one of four different programmes. Three of them, i.e. the Master of Forest Sciences, the MSc Spatial Development and Natural Resource Management and the MSc Wood Technology and Wood Economy are taught in German language. The programme MSc Tropical Forestry and Management is offered in English for an internationally composed group of students of about 25 participants mainly from South American, African and Asian countries.

Status quo – Bachelor of Forest Science

Background and facts

The Bachelor study programme in Tharandt assures a versatile and diversified education to its students. The range of subjects in forest sciences is made attractive by a combination of forest related aspects of natural, economic and social sciences. Nevertheless forest education is and will be the main objective of the Department of

Forest Sciences. Although addressing the linkages to other fields of science, the core competences of forestry never disappeared from sight. Beside knowledge in the complexes (1) ecological interactions, (2) biometrics and modelling, (3) humans and forests, (4) benefits of forests and (5) international aspects, there is a focus on imparting key qualifications to the students to improve their chances on the academic labour market. Knowledge transfer of transferable skills like communication, rhetorical capabilities, techniques of scientific working and social competences assures this intention. In addition to a basic obligatory study catalogue of altogether 115 ECTS credits encompassing all aforementioned complexes, students have to cover 40 ECTS credits in elective courses. To these belong:

- fourteen interdisciplinary modules of which four have to be chosen;
- four regional excursions of several days duration where at least one has to be attended;
- four modules for general qualifications (environmental communication, social competency, informatics, language course in English where at least one has to be successfully completed).

The bachelor thesis values 15 ECTS credits and is featured with a time slot during 6th semester.

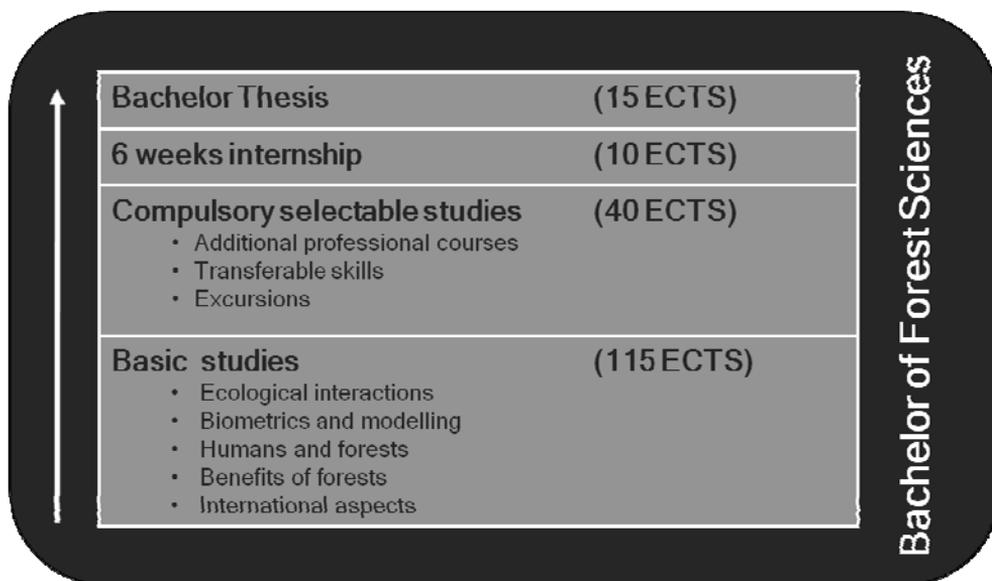


Figure 1: Construction of study programme “Bachelor of Forest Sciences” at Technische Universität Dresden

The study programme is well rounded with forestry related practical experiences to be acquired by an obligatory internship of at least six weeks which counts 15 ECTS credits. Special time slots at the beginning of 3rd and 5th semester exist for that purpose.

Figure 1 visualizes the construction of the department's bachelor education. It does not reflect the chronological structure of the study programme. Current general time slots for internship as well as bachelor thesis are provided during the programme. During implementation of the bachelor programme this proved of value. In similar coherence it appears to be problematical that the course of study offers no semester without obligatory courses at present. This leads to problems in keeping the prescribed time frame of studies if exchange semesters are done.

Experiences

In summer 2010 the first batch of students finished the new Bachelor programme in Tharandt and the first Bachelor's certificates were handed out. Altogether 42 students graduated with a Bachelor degree. This is to be seen as a great success after implementing a study reform with immense changes in structures and teaching contents.

During the first run through of the bachelor programme it became obvious that the complexity of study organisation is higher than in previous programmes. The interdisciplinary courses offer excellent improvements with regard to content and teaching methods. On the other hand, they have to be seen as a mixed blessing. Planning during the academic calendar is highly time consuming for each institute. Time schedules, exam periods, room allocation schedules and coordination between the lecturers are the main reasons for this. Difficulties originate in this context especially out of "tiny lecture units" which arise by the combination of too many lecturers teaching in the same module. Moreover, the exam load is very high for students as well as lecturers. Due to the Bologna process and the internal decision of Technische Universität Dresden two exams per module have been regarded as obligatory. Consequentially, students experience the positive effect of compensation but also a double burden in examination effort. Further it is to assert that the institutes have to handle an abrupt rise of seminar papers and final thesis to be evaluated.

The absence of a special time slot devoted to mobility might be solved by reorganizing the academic calendar. Therefore, a semester without obligatory basic study modules is needed. To complete the advantages of a mobility time slot, the recognition arrangements of modules passed at other German or foreign universities have to be reassessed.

Future perspectives

Experiences made during implementing the new Bachelor study programme in Tharandt lead to a predominantly positive impression. The general approach proved of value but possibilities for improvements could be found. For that reason, the official study committee, the technical committee and the professors' plenary meeting agreed in reforming the bachelor curriculum. Hence the task force „BSc II“ was established and works on suggestions for improvement. Minor changes with major effects are expected.

Like during constructing and planning the new Bologna compatible bachelor and master curricula this will be done in close cooperation with the External Advisory Board of Forest Sciences during the reform process (compositions and tasks of the Board have been described by Grosse et al. (2013) in the proceedings of the SILVA Network Conference in Thessaloniki 2009)

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BOLOGNA CYCLES 1-3 AT THE TECHNISCHE UNIVERSITÄT MÜNCHEN, GERMANY: CURRENT STATUS AND NEW DEVELOPMENTS IN CYCLE 3

GERHARD MÜLLER-STARCK, MARTIN ZIESAK AND ARNE SCHIEDER

Abstract

Examples are presented which address Bachelor and Master curricula of the Technische Universität München in the field of forest science. Concerning Bologna Cycle 3 programmes, a new initiative is presented which may substantially improve the situation of PhD students. A system of rewarding academic activities of PhD students is expected to efficiently increase abilities and experiences of young scientists in conducting their research programme, in efficiently presenting the results of their research and improving their communication with colleagues. Various educational and "structuring elements" help to assure quality standards. It is noted that a better connection between Bologna Cycles 2 and 3 programmes can be looked at as a very efficient tool in reducing the period until acquiring doctoral degrees and increasing the quality of PhD student programmes.

Introduction

The kaleidoscope of European curricula in the field of forest science ranges between three - four years for Bachelor's curricula, one - two years for Master's curricula and still supplies Diploma constellations varying between four and five years. Some universities offer the Master's degree following an undivided curriculum of five years in duration (e.g. the University of West Hungary, Sopron), others with duration of four years for the Bachelor's degree and two additional years for the Master's degree (e.g. Technical University of Madrid).

Curricula of the Technische Universität München (TUM) follow the Bologna Cycles 1 and 2 (three years for the Bachelor's degree and two additional years for the Master's degree) but reveal new perspectives concerning Bologna Cycle 3. The main purpose of this contribution is to present this concept which is expected to increase both the quality of PhD student programmes and the individual efficiency of students within their research tasks.

Bachelor and Master following Bologna Cycles 1 and 2

The Technische Universität München (TUM) has 13 faculties, one of which is the "Centre of Life and Food Science" (Wissenschaftszentrum Weihenstephan für Ernährung, Landnutzung und Umwelt, "WZW"). This faculty is the conjunction of three former faculties in the fields of life science technology, agricultural and

horticultural science, and forest science. It is the only faculty of TUM which is organised as “matrix structure,” which means that it is sub-structured in schools (“Studienfakultäten”) and research departments. At TUM, this is a unique constellation which is expected to supply substantial synergistic effects in both research and teaching.

The matrix structure is displayed in Figure 1. The first column lists the six schools, each offering bachelor and master curricula, replacing the former diploma curricula (still existing diploma curricula which will be soon terminated). The current six research departments are listed at the bottom of Figure 1 with addition of links to the “TUM Business School” and other TUM faculties. The areas marked in blue display the affiliation of a total of 77 institutes or chairs (“Fachgebiete”, “Lehrstühle”) to the respective schools and research departments.

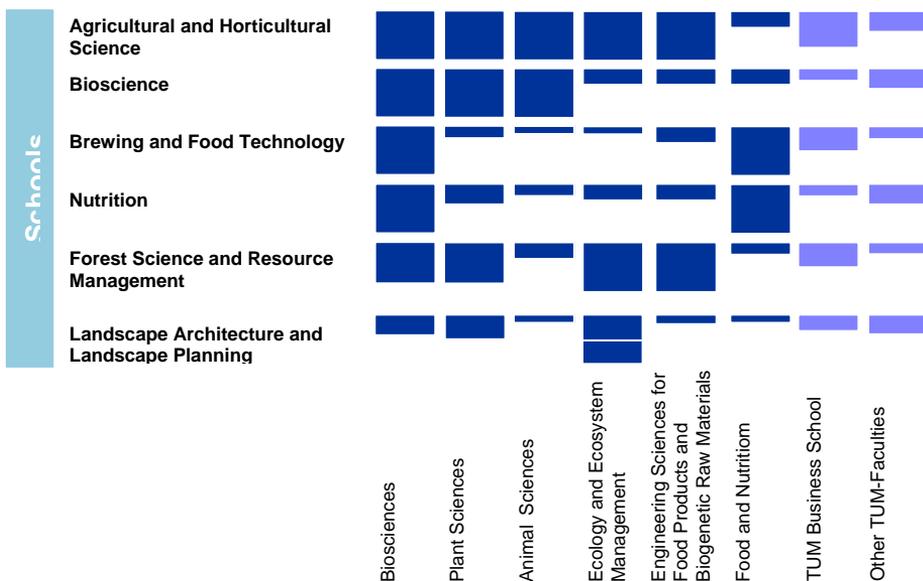


Figure 1: Matrix structure of the TUM Centre of Life and Food Science involving six schools and six research departments with additional links to the TUM Business School and other TUM faculties. Source: TUM Centre of Life and Food Science (“Faculty WZW”), 2010, pers. comm.

Table 1: Survey of study courses of the TUM School of Forest Science and Resource Management

Bologna Cycle 3 PhD Sustainable Management of Environment and Resources (German/English) PhD student programme, 3 years	
Bologna Cycle 2 Master in Forest and Wood Science (German) Graduate programme, 2 years	Bologna Cycle 2 Master in Sustainable Resource Management (English) Graduate programme, 2 years
Bologna Cycle 1 Bachelor in Forest Science and Resource Management (German) Undergraduate programme, 3 years	

Within the School of Forest Science and Resource Management, one Bachelor and two Master curricula are offered as well as a PhD student programme entitled “Sustainable Management of Environment and Resources” (German/English; see Table 1).

The duration of the Master curricula is two years including two months for an internship. The total number of ECTS units is 120 (four semester, 30 ECTS per semester). The corresponding partitioning is illustrated in Figure 2.

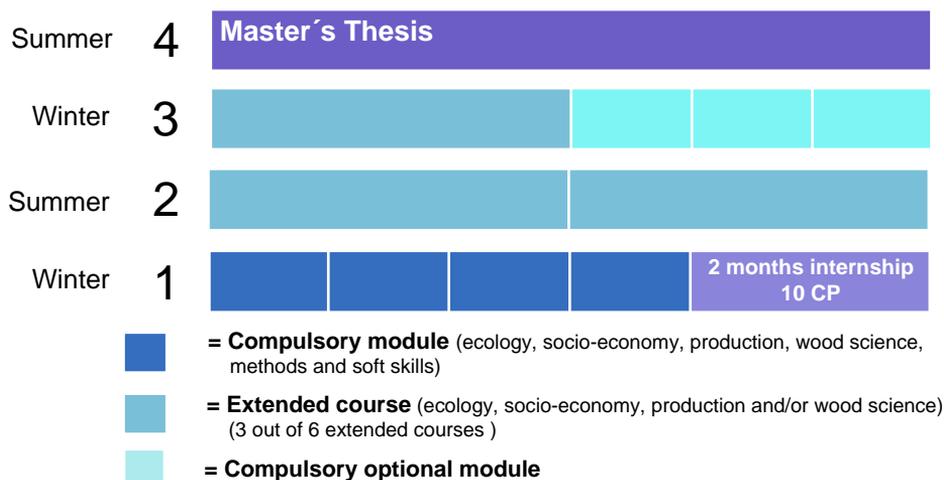


Figure 2: Structure of master curricula at the TUM School of Forest Science and Resource Management (duration of four semester; CP equivalent to ECTS). A module contains several lectures. Source: Ederer, pers. comm., 2010.

A new perspective for PhD student programmes (Bologna Cycle 3)

As indicated in Table 1, the School of Forest Science and Resource Management has established a three year PhD student programme. Parallel to this initiative,

which is still pursued, the TUM has started a unique programme in the sense that PhD students receive financial support up to € 3,300 in total from TUM (extra to their contracts) if they follow the programme according to the given time schedule and the demand for at least one publication in a reviewed journal or peer reviewed proceedings of an international congress (details given below). The structure of this PhD student programme, realised at the Weihenstephan Campus (Faculty WZW) of the TUM is presented in Figure 3.

The targets of this programme are:

- subject-related research training and interdisciplinary exchange;
- networking in professional circles;
- training of “metadisciplinary“ key skills;
- international cooperation;
- access to job market, inside and outside science.

The central focus of the PhD student programme still is the active and autonomous research work of the doctoral candidates. Membership is voluntary and is acquired by enrolment of the doctoral candidates of the WZW, a supervision agreement at a minimum time of one year of work left. This agreement signed between the PhD student, PhD supervisor and a mentor and can be changed due to changes in working progress. It contains a time schedule, working condition and financial issues, a midterm review and further education and ”structuring elements“ such as seminars, subject-related training, lab tutorial and metadisciplinary training. Modifications due to changes in working progress are possible. Details including demands for one publication and participation in international cooperation are compiled in Table 2.

The expected effects and potential benefits are additional funding for the training of PhD students and international cooperation, new obligatory “structuring elements“, utilisation of existing networks with “Helmholtz Zentrum München” and additional institutional links, and the chance to include external PhD programmes as indicated by the red arrows in Figure 3. By this, the mobility of PhD students can be increased substantially.

The funding for TUM-Graduate School, which spans over all TUM Faculties, currently amounts to 2.4 Million Euro. The money originates from the TUM overhead budget and to a certain extent from third party sources.

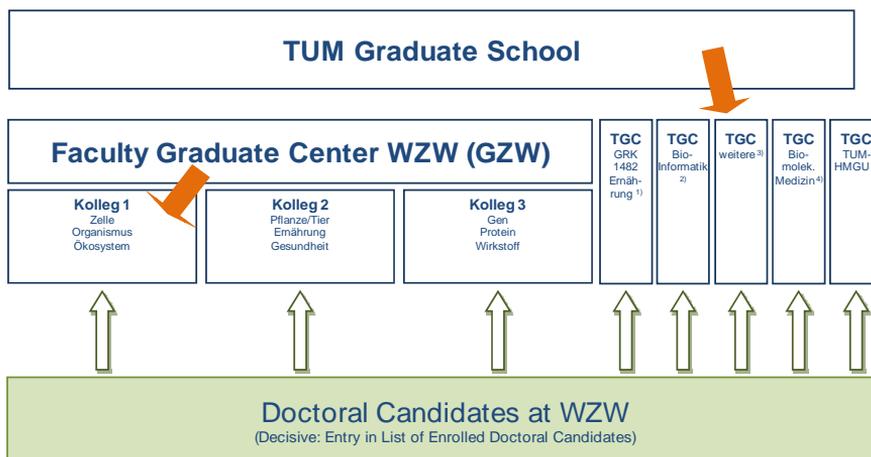


Figure 3: PhD student programme of the Faculty WZW of the Technische Universität München. Red arrows indicate possible integration of external programmes.

Concluding remarks

The new PhD student programme of the Technische Universität München offers various degrees of freedom particularly in terms of financial support for attending meetings, publishing papers, and getting in contact with people and institutions. The system of rewarding academic activities of PhD students is expected to efficiently increase abilities and experiences of young scientists in conducting their research programme, in efficiently presenting the results of their research, and improving the communication with colleagues. Various educational and “structuring elements“ help to assure quality standards. This is done without hampering the core element of every PhD project, i.e. to broaden the state of knowledge and to communicate it first to the science community.

In the long run, two flanking instruments are considered to be particularly helpful in improving the efficiency of doctoral projects: firstly, the better linking of Bologna Cycles 2 and 3 programmes in order to identify candidates as soon as possible and to shorten the duration of doctoral projects; and secondly, to establish Career services (2010) as well as Alumni networks (2010) in order to increase the chance to find adequate jobs (e.g. Ziesak and Müller-Starck, 2010).

Table 2: Survey of educational and „structuring elements” of the joint PhD student programme (TUM Graduate School (TUM-GS) and external contributors (“GZW")), and structure of the budget. “SWS” means hours per week during the semester.

Educational and „structuring elements“ I and II		
<i>(I)</i>	<i>for 3 years</i>	<i>per semester</i>
Kick-Off seminar:	4 days	--
Subject-related training:	6 SWS	1 SWS
Active supervision of lab tutorials:	4 SWS	0,7 SWS
„Metadisciplinary training“:	3 courses (3-6 days)	0,5 – 1 day
End seminar:	1 day	--
Total (I):	10 SWS	1,7 SWS
	8 – 11 days	1,5 – 2 days
<i>(II)</i>		
One publication (reviewed journal or peer reviewed proceedings of an international congress).		
International cooperation: 6 weeks (alternatively: guest researcher project / cumulative).		

Budget PhD student (excluding fees and costs for living)	
Tickets for „Metadisciplinary courses“	€ 500
Ticket for Kick-off and End Workshop	€ 800
Internationalisation grant	€ 1,600
Possible award for publication	€ 200 – 400
<i>Overhead:</i>	-
Lump sum GZW (possible award)	€ 1,500 – € 1,700
Lump sum TUM-GS	€ 1.000
Total:	€ 5,400 – € 6,000

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THE FACULTY OF FORESTRY AT THE UNIVERSITY OF WEST-HUNGARY AT SOPRON, HUNGARY

FERENC LAKATOS

Abstract

The Faculty of Forestry at the University of Hungary was established more than 200 years ago. These 200 years are characterized by continuous changes: Relocation from Selmechánya/Banska Stiavnica to Sopron, reconstruction of the university structure (first a university aimed at mining, metallurgy and forestry, than at forestry only, followed by a forestry and wood technology university, and finally one faculty in the frame of University of West Hungary, a university with ten faculties in five cities). The Faculty of Forestry offers now five study programmes: forestry (five years undivided MSc), environmental engineering (BSc and MSc), environmental sciences (BSc and MSc), nature conservation (BSc and MSc) and wildlife management (BSc and MSc). The faculty has two doctoral schools (Forest and Wildlife Management Sciences, Environmental sciences). A great variety of research projects is running at the Faculty in different fields related to forest and environmental sciences.

Short history

The predecessor of the Faculty of Forestry was the School for Training Mining Officers founded by the Austrian/Hungarian king Charles III in Selmechánya in 1735, which was raised to an academic rank by Maria Theresa in 1762. In 1807 the Chamber of Royal Mint established the Forestry School within the Mining Academy and made Henrik David Wilkens its director. He started giving lectures in 1808. This year is regarded as the year of foundation of the legal predecessor of the Faculty of Forestry, and this date appears on its crest.

The most distinguished professors of the era were: physicist Christopher Doppler; Rudolf Feistmantel, who reorganised the order of the imperial wooded properties and supervised the elaboration of the first Austrian/Hungarian forest law; Károly Wagner, the creator of the Hungarian professional terminology of forestry, and of the first Hungarian forest law and the founder of the Forestry Journal still published today; and Jenő Vadas, the establisher of the Hungarian forestry research.

In 1919 Selmechánya ceased to be a Hungarian town. It belonged to the new republic Czechoslovakia and therefore the College moved to Sopron. The town offered a building complex to the College in a ten hectare park. The College obtained the right of conferring honorary lecturer titles and the right to offer "habilitation" procedure and degree for professors. From 1949 on the Faculty of Mining and Metallurgy was gradually separated and moved to Miskolc. After the

defeat of the 1956 revolution and freedom fight a large proportion of teachers and students left the country. Most went to Canada, where they formed the Hungarian division of the Faculty of Forestry at the University of British Columbia, and finished their studies there. Several of those who left Hungary won international recognition as a result of their work in Canada, in the USA, Germany, Switzerland and Austria.

Within the Faculty of Forestry the training of wood industry engineers started in 1957. With the establishment in 1962 of the Faculty of Wood Sciences, the University of Forestry and Wood Sciences came into being. Ten years later, the Land-Surveying and Land Management College Faculty joined the university. After the launch of the Faculty of Economy and the reorganisation of the institutes the University of Sopron was established in 1996. After the realignment of the higher education system in the country the University of West-Hungary (UWH) was founded in 2000. The UWH has now 10 faculties in 5 cities (further details: www.nyme.hu).

The institutional and educational system of the Faculty of Forestry has changed several times in the last decades. Besides forestry, the faculty offers four additional study programmes: environmental engineer (1993-), game management (1993-), environmental sciences (2002-) and nature conservation (2003-). Except forestry, where the education runs in a five years undivided system, the study programmes are according to the Bologna system (BSc and MSc).

The Faculty of Forestry has a significant scientific capacity. Its research strategy fits into the research-development innovation strategy of the UWH (with the slogan “green university”). It represents great variety of forest, environmental and natural sciences, and serves as a basis for a high-level university education. The faculty has two doctoral schools in ‘Forest and game management science’ and ‘Environmental sciences’.

The Faculty of Forestry maintains relations with several domestic and foreign universities. There are frequent student and lecturer exchange programmes. There is excellent co-operation with the faculties of forest sciences of Albert-Ludwigs University of Freiburg, the Georg August University of Göttingen and the University of British Columbia in Canada.

According to a student opinion poll, made by the National Higher Education Information Centre (OFIK), published under the title “Universities on the Balance” in 2005, the Forestry Faculty of the University of West Hungary is the faculty with the best atmosphere. The Faculty of Forestry received the Civitas Fidelissima award from the Mayor of Sopron on the “Day of Fidelity” in 2008.

Education at the Faculty of Forestry

Our students can study in a dynamically developing university environment; the large-scale infrastructural developments in recent years modernised the teaching environment and improved the comfort of student life. There are several facilities for sports, entertainment, useful and pleasant leisure time activities.

Elective subjects offer students an insight into other professional fields as well. There are opportunities for concurrent education, or involvement in the programmes of other domestic and foreign educational institutions.

Nurturing talent has great traditions at our faculty, as students are involved in the research of the departments, and our student circles and intellectual workshops are operating successfully. There is a great emphasis laid on foreign language teaching. Some of our elective subjects are taught in English, and we encourage our students to study at foreign educational institutions.

Special features of the student life in Sopron are the students' attire determined by the traditions, the greeting "Jó Szerencsét" (good luck), and the university and student ceremonies organised according to centuries-old rules, which enrich students with life long memories and friendships. The Faculty of Forestry has great traditions, and it is known and recognised all over the world.

The majority of our lecturers have at least PhD degrees, and many of them are internationally acknowledged experts. Their educational work is complemented by the lectures of guest professors coming from different fields.

Study Programmes of the Faculty of Forestry

Forestry Engineering Curricula

- MSc forestry engineering curriculum (five years undivided, full-time education).

The basic aim of the education of forest engineers is to prepare them for sustainable forest management based on a profound knowledge of the biological systems and the environment. The up-to-date forest engineering education involves the knowledge of several areas of science; our students receive basics and advanced level knowledge in ecology, technology and economy.

Environment Protection Engineering Curricula

- BSc environment protection engineering curriculum (full-time education);
- MSc environment protection engineering curriculum (full-time education).

The basic aim of the education is to prepare students for comprehensive and continuously renewing environment protection engineering activities: recognizing environmental threats, planning and controlling measures to prevent or stop

environmental damage, mitigating or eliminating environmental harms and damage, disposing of toxic waste, recycling and developing low-waste technologies.

Environmental Science Curricula

- BSc environmental science curriculum (full-time education);
- MSc environmental science curriculum (full-time education).

The aim of the education is to teach applied environment researchers, who are capable of working in the field of applied environmental science with their knowledge of mathematics, information science, chemistry, geology and biology.

Nature Conservation Engineering Curricula

- BSc nature conservation engineering curriculum (full-time education)
- MSc nature conservation engineering curriculum (full-time and correspondence education)

The basic aim of the education is to prepare students for comprehensive and continuously renewing nature conservation engineering activities. The up-to-date nature conservation engineering education involves the knowledge of several areas of science. Our students receive basics and professional education in ecology and economy.

Wildlife Management Engineering Curricula

- BSc wildlife management engineering curriculum (full-time and correspondence education);
- MSc wildlife management engineering curriculum (full-time and correspondence education).

The basic aim of the education is to prepare students for comprehensive, modern and continuously renewing wildlife management activities and to develop a committed environment conscious attitude.

Doctoral Programmes of the Faculty of Forestry

Kitaibel Pál Doctoral School of Environmental Science

The Kitaibel Pál Doctoral School of Environmental Science was initiated by Prof. Dr. Csaba Mátyás, head of the Institute of Environment and Earth Sciences and approved by the Hungarian Accreditation Committee and by the Minister of Education in 2002. Focusing on environmental sciences, the School encompasses the scientific areas of environmental biology, environmental chemistry and environmental physics, as well as the related engineering and social sciences. Several regular members and consultants of the Doctoral School are research workers, employed by the Geophysical and Geodetic Research Institute of the Hungarian Academy of Sciences, the Forest Research Institute and the Geological Institute of Hungary. The wide range of the fields of research provides a great choice of research topics in the basic and applied scientific areas of environmental science. Recognising the importance of adequate communication of environmental problems, and the development of environmental consciousness, the School offers

the possibility – uniquely in Hungary – to research topics of environmental pedagogy.

The wide spectrum of the research areas of the Doctoral School, allows an equally wide range of admittance, with forty different university qualifications from agricultural sciences to environmental informatics. Students of the Doctoral School can obtain a unique insight into the complexity of dealing with environmental problems, and can take part in numerous international and domestic research projects. Well-equipped research laboratories (e.g. for chemistry, geophysics, ecology and genetics) and field stations (e.g. for hydrology, climatology, ecology, geology, geophysics, etc.) support student research. Some of the courses are offered in foreign languages.

The PhD degree in environmental science entitles for positions in higher education and in research institutions, and there are career opportunities at industrial research and development companies, at nature conservation authorities, and local governments.

The head of the Doctoral School is Prof. Dr. Csaba Mátyás, member of the Hungarian Academy of Sciences. The operation of the School is assisted by eight members of the PhD Council.

The Kitaibel Pál Doctoral School of Environmental Science runs four study programmes, which are the following

- Bio-environmental Science Programme. This programme offers courses and research topics in basic and applied biology, ecology and related fields, such as environmental engineering and environmental technology (modelling, impact assessments, environmental auditing, utilization of renewable resources, bioenergetics, emission reduction, etc.), as well as in social science topics related to environmental science (sustainable development and regional planning, environmental management, rural development, and landscape management).
- Geo-environmental Science Programme. The programme comprises the scientific areas of environmental geodesy, geo-informatics, general and applied geophysics and geodynamics, topics related to the inorganic elements of the natural environment. In addition to analysing and modelling processes in the atmosphere, at the earth's surface and in near-surface geological strata, the programme includes the development of geological assessment methods applied in environment protection.
- Environmental Pedagogy Programme. Environmental pedagogy is a multidisciplinary field of study, which prepares students with a comprehensive background in natural and social sciences to teach environment consciousness and to develop related activities. The aim of study and research is to develop educational methodology and practice at every level of public education, from

kindergarten to higher education, and thus enhance environment consciousness through methods fitting the age of pupils and students.

- Geo-informatics Programme. The rapid development of GIS, the expansion of satellite monitoring and positioning methods led to the initiation of a separate Geo-informatics programme at the Doctoral School. It offers courses and research opportunities in the field of land management, surveying and geo-informatics, mainly related to agricultural management and land use, including the application of the modern technical tools of thematic modelling, remote sensing and mapping.

Roth Gyula Doctoral School of Forestry and Wildlife Management Sciences

The Roth Gyula Doctoral School of Forestry and Wildlife Management Sciences was established in 1993. The existing framework was approved in 2002 by the Ministry of Education with the recommendation of the Hungarian Accreditation Committee (HAC). The accreditation renewal was completed in 2008 by the HAC, and its curricula were authorized.

The Doctoral School has six PhD programmes which encompass all the branches and interfaces of forestry and wildlife management sciences. The core members are from the Faculty of Forestry and the Forest Research Institute (ERTI), but a number of subjects are taught by other faculties of the University: (Faculty of Wood Sciences, Faculty of Natural and Technical Sciences), the Geodetic and Geophysical Research Institute (GGRI), the Hungarian Museum of Agriculture, the Ministry of Environment and Water.

Education and research at the doctoral school are pursued in the basic and applied sciences, related to forests, wildlife, and nature. It is the only doctoral school in Hungary, where all the personnel and material conditions are provided for an independent doctoral school in these areas of science.

This wide spectrum of studies makes it possible that a wide range of students are addressed and received in the PhD programmes for foresters, environmentalists, horticulturists, ecological engineers, agricultural engineers (including economic, environmental, rural development, and mechanical courses), landscape designers, veterinarians, applied zoologists, biologists, biology teachers, etc. The students have a widening and well-equipped infrastructure, laboratories, research stations supporting field work, SUVs, rich collections, institutional and central libraries. The university library is also the National Forestry Library in Hungary.

The doctoral students can visit foreign research institutions and participate in international and national research cooperation through the international connections of the institutes. The knowledge and the degree gained at the Doctoral School are a good reference when applying for leading positions in higher education institutions, research institutes, forestry, wildlife management and conservation.

The Head of the Doctoral School is Prof. Dr. Sándor Faragó DSc. of the HAS. The operation of the school is assisted by 9 members of the PhD Council.

The Roth Gyula Doctoral School of Forestry and Wildlife Management Sciences educates in six doctoral (= PhD) programmes:

- Ecology and Diversity of Forest Ecosystems. Research on the composition, structure and inter-reactions of forest ecosystems is part of the programme. Geographical conditions vital for forest management and the requirements for maintaining sustainable management and preserving the stability of ecosystems are identified. The main areas of research are: site conditions of forest stands, hydrology, climatic conditions, and the diversity of forest ecosystems, such as soil microbiology, physiology, botany and dendrology, species composition, structure, dynamics and inter-relations of ecosystems, and the evolutionary and genetic processes of woody plants.
- Biological Basis of Forest Management. The doctoral programme teaches silviculture, production of seed material, wildlife management, forest, tree and plant protection, and zoology, adopting the latest experimental and research findings, related both to plantation forestry and to nature-oriented management. These areas were not integrated in the previous programmes.
- Forest Assets Management. The subject is concerned with the analyses of the stock type characteristics of forests and forestry processes in natural and financial terms, as well as the harmonization of the legal and economic regulations with forestry interests. Disciplines of the forest assets management programme are: forest management planning, computer science applied to forestry, forest and hunting rights, forestry history, hunting and forest policy, economics for forest and wildlife management (forestry accounting and finance, forest and damage assessment, structure of wildlife management organizations, and sales and marketing policy).
- Forest Technology. This programme provides a comprehensive, scientific approach to the technical implementation of forestry policies (mechanisation, energetics, forest utilization, forest accessibility and water management) based on measurements and experiments. It deals with the improvement of mechanisation in reproductive material production, silviculture, forest and timber utilization, and with the development of mechanisation in energy tree plantations, the connection between mechanisation and environment protection, wood for energy production, planning, organization and technology of forest utilization, topics of opening-up and water management as well as with forest road construction and maintenance. The continual development and modernization of the technical approach to forestry ensures an economically and ecologically sound implementation of a nature-oriented forest management that can meet social demands.
- Wildlife Management. Today wildlife conservation, protection and stock management are done through an up-to-date, rational management. In the doctoral programme, students deal with the forest, field and water ecosystems and their species and communities of species. The research topics embrace all

the areas of open field game conservation and management and all the fields of hunting, as well as all the related sciences such as the kennel, gun ballistics, trophy assessment, wildlife health, game management, wildlife forage ground and game feeding, economics and history of the science.

- Nature Conservation. The Nature Conservation programme aims at the implementation of a scientific programme that monitors international strategies addressing natural challenges of global issues and their effective application to Hungary. The programme encourages nature-conscious development and experiments in the national conservation practice, while strengthening scientific grounds of professional and political efforts. It will involve a talented new generation in the innovative research. It aims to educate experts who are not only professionals, receptive to theory, but experts with positive values of life and healthy ecosystems.

Research at the Faculty of Forestry

Research is a traditionally predominant area at the Faculty of Forestry as it is vital to maintain high standards of higher education. Research is done mainly within the cooperating institutes. However, recently there have been several examples of cooperation between different institutional units and sharing work between the faculties. The future of forestry education lies in simultaneous teaching of basic and applied sciences. Besides traditional disciplines of forestry and wildlife management, environmental sciences and nature conservation courses are breaking new ground.

In order to increase efficiency and expand the scope of research themes, the Faculty cooperates with Hungarian scientific institutions, with professionals at academic and scientific institutions (Forest Research Institute), and with scientists at the partner universities and industrial research centres. The Faculty has a tradition of good connections with forest managers and the supervisory bodies of the individual disciplines. Having a traditionally high level of basic research, the education programme is continuously updated to meet demands of the industry and requirements for scientific and technological research. The focus of research is on results which can be applied to practice.

To promote research work the faculty set up two centres:

- The Environmental Protection and Resource Management Joint Research Centre (JRC) was established to enable a quick practical application of the research and development (R&D) results by the involvement of a number of companies as consortium members in research and development. The R&D activities of the Centre are divided into three distinct research areas:
 - Development of assessment methodology and application of environmental impacts;
 - Waste treatment and recovery;
 - Eco-energetics.

- Forest and Timber Utilization Regional University Knowledge Centre (ERFARET), was established with the Faculty of Wood Sciences to enhance forest and timber utilization in the region. The Forestry Faculty cooperates with ERFARET in the following research areas:
 - Development of forest resources management in the region;
 - Nature-oriented forest management and forest conservation,
 - Technical development of forest management;
 - Establishing conditions for sustainable wildlife management.

The R&D work of ERFARET has gained nationwide recognition. The funding scheme for research at universities is continually changing, and to get additional grants, the tender system will be used. Lately the members of the faculty have achieved excellent results in tendering. Beyond the development of instruments, the IT network and infrastructure, recent grants provide scope and facilities for the mobility of teachers, researchers and students, and open doors to the extension of libraries and aid the organization of conferences.

Conclusions

It is difficult to predict, how the expectations and regulations will change in the future. However, we can be sure, that there will be changes. The only way is, to be well prepared, the continuous update of our education, including the improvement of present study programmes and establishing new one. The open borders of the EU make the higher education market also open. Exchange of students and academic staff are supported both by the EU and the national government. We should take advantage of this support and enforce our students and colleagues to go abroad and acquire teaching and research experience there.

In higher education research is a crucial point. We have to strengthen our international cooperation in all fields and maintain the existing cooperation with our partners in and outside Hungary.

INCENTIVES FOR INTERNATIONAL BSC MOBILITY: CASE OF FACULTY OF FOREST AND ENVIRONMENTAL SCIENCES IN THE FRAME OF THE DAAD PROGRAMME "BACHELOR PLUS"

REINER MÜHLSIEGL AND SIEGFRIED LEWARK

Abstract

International mobility has been one of the key objectives of SILVA Network activities and conferences from the very beginning. The numbers of European forestry students studying abroad have gone down after introduction of BSc and MSc study programmes instead of the traditional one cycle study programmes, which obviously gave better chances for a study semester abroad.

An initiative taken in Germany to facilitate international student mobility under the Bologna structures is presented. Forestry students of the University of Freiburg can study one year in Canadian universities with funding from DAAD. This year may be acknowledged for a subsequent Master study programme, which thus may be shortened to one year – a structured incentive for mobility for seven students per year.

Key words: mobility, forest sciences, DAAD, Germany, Canada, Bologna process

The problem of student mobility in two cycle study programmes

International mobility of students, especially on European level, has been one of the key objectives of the Bologna process. But in many European countries where the curricula have been transformed from one cycle (Diploma) to two cycle (BSc and MSc) structures this seems not to have worked well.

This has also been true for the European forestry students, which was a major concern brought up in all of the last SILVA Network conferences. This phenomenon is of particular significance as traditionally international mobility of forestry students (and teachers) has been very high. Mobility has been one of the key objectives of SILVA Network activities and conferences from the very beginning; in fact it was founded to stimulate mobility (Anonymous, 2001)

The reasons for this development are obvious: the study programmes in the two cycle structures are in general more tight than the old ones in terms of numbers of obligatory courses, which does not allow semesters abroad without additional study time. Consequently the majority of the students, not wanting and/or not able to afford to study longer than the prescribed time will be less mobile than in the old study structures. Information about mobility is contained in the graduate analyses

done in many universities as presented at the SILVA Network conference of 2008 (e.g. Grosse, 2010; Mühl siegl *et al.*, 2010).

The concern of reduced international student mobility is shared by many colleagues and faculties of forestry. Universities and education authorities are looking for ways out.

Incentives for more international student mobility

What the faculties of forestry can do and in fact do: restructuring study programmes in a way, that one semester is free of obligatory courses, in most cases the fifth semester in BSc programmes of six semesters. This works even better, when acknowledgement of credits from study courses abroad is made more easy, i.e. when not asking for 100 % compliance of courses abroad with courses of the home university. In this respect the faculties are of course to a high degree depending on the rules of acknowledgement of the universities or higher education authorities on higher levels.

Another incentive would be to accept study semesters of BSc students abroad as part of a later Master study programme. Of course this is only moving the problem from the BSc to the Master level: If you would have a tight Master programme later with many obligatory courses or credits, it does not help to have the BSc semester abroad acknowledged as a Master semester, as then you would study longer in the Master programme.

Of course this is a very formalistic perspective: A semester or even a year abroad would be a huge gain of competence (subject specific, social, general international and language competences) for every student who can afford to study longer. But this is not the point to be discussed here when the Bologna process at the same time attempts to shorten study times (partly through achieving employability of BSc graduates) and to increase international mobility (Himpele *et al.*, 2010).

There is an incentive by DAAD in Germany following this idea of accepting study semesters of BSc students abroad as part of a later Master study programme (WDH), the so called Bachelor Plus programme (Box 1). The Faculty for forestry and environmental sciences of the University of Freiburg has realized such a Bachelor Plus programme for forestry students in cooperation with Canadian Faculties of forestry, which will be presented below.

The German Bachelor Plus Incentive (2010)

- financed by the Federal Ministry of Education and Research (BMBF)
- managed by the German Academic Exchange Service (DAAD)
- main goal: enhance the mobility by supporting German universities offering international orientated BSc study programmes
 - by starting new 4 year BSc programmes including 1 year abroad
 - or adding a 4th year abroad to a 3 year BSc programme
- financial support for:
 - scholarships (incl. health insurance and support for travel)
 - study fees (max. 50%)
 - support for meetings of organizing and participating universities
 - visiting teachers
 - staff costs in research and administration
 - max. funding of 80.000 € year/project
 - max. 5 years of support, new/ proposal each year

Box 1: Incentive by DAAD in Germany: Bachelor Plus programme

The presentation is based on documentation accessible in the internet (www.bachelor-plus.uni-freiburg.de). As far as documented the question of study time of Master students who participated in this programme, having studied one year at one of five Canadian universities has not been evaluated, which would be very difficult in any case, as somebody who studies longer than the minimum study time of a study programme may do this for different reasons, not only because of a semester abroad as a BSc Bachelor plus student.

Diploma Forest Science and BSc Forestry and Environment - enrolled Students 2005/2006 - 2009/2010

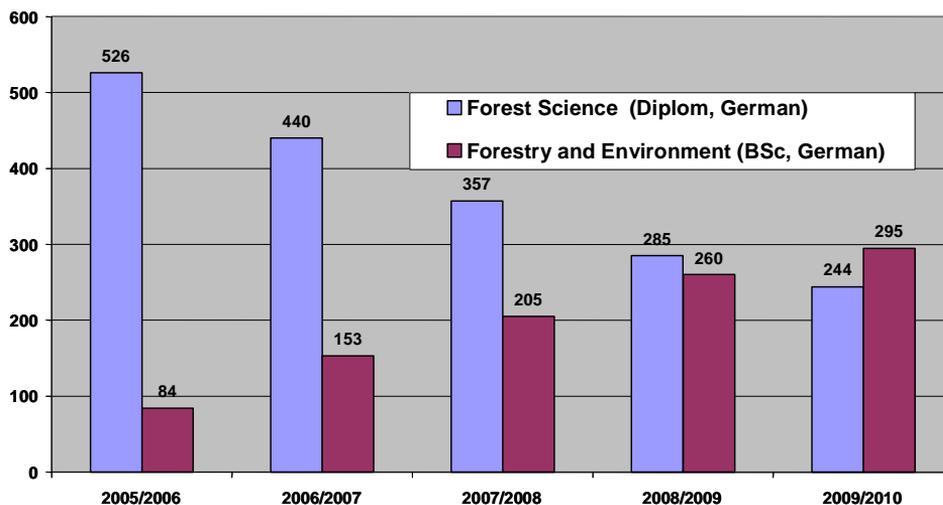


Figure 1: Numbers of students enrolled in the new BSc study programme “Forestry and Environment” and in the phasing-out Diploma study programme of Forest Sciences

Case of the University of Freiburg: study programmes and mobility

At the Faculty of Forest and Environmental Sciences of the University of Freiburg the Bachelor study programmes according to the Bologna process have been started in 2005. Enrolment numbers in the new study programmes and in the phasing-out Diploma study programme of Forest Sciences are given in Figure 1 as a background.

The development of numbers of outgoing and incoming students of forestry under the Erasmus scheme, which of course does cover only a big share but not all international mobility, is shown in Figure 2. Whereas the numbers of incoming Erasmus students shows a fluctuation between 9 and 16 and no clear tendency of development, the numbers of outgoing Erasmus students went down dramatically.

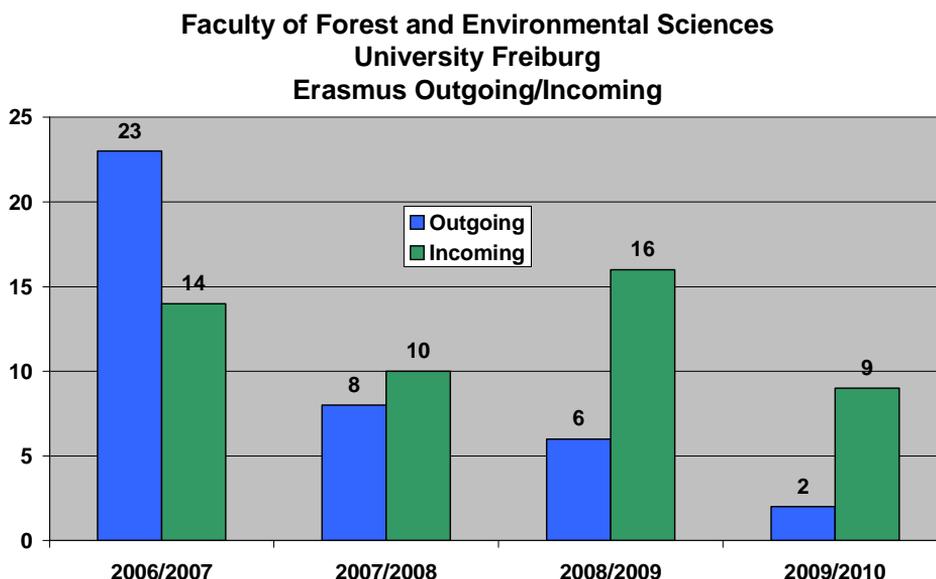


Figure 2: Numbers of outgoing and incoming students of forestry at the Faculty of Forest and Environmental Sciences of the University of Freiburg under the Erasmus scheme

BachelorPlus study programme in Freiburg

To facilitate BSc students to study a year abroad, a Bachelor Plus study programme was developed at the Faculty of Forest and Environmental Sciences of the University of Freiburg was developed. This so called Global Track programme “Waldwirtschaft und Umwelt-Profi” (Profil Formation by Internationalisation of Forest Sciences) in the framework of the BSc study programme “Waldwirtschaft und Umwelt” (Forest Management and Environment) has been initiated by Prof. Spiecker (Institute of Forest Growth) as a coordinator, together with the Vice-Dean Prof. Fink, based on the experience and network of an existing Canada exchange project (dual Master degree programme TRANSFOR-M). The Canadian partners are the forestry faculties of the Universities of Toronto, Vancouver, Edmonton and Fredericton. Basic details about this special programme are given in Box 2.

Since 2010 seven students from the BSc programme Forest and Environment will be funded each year by the Deutsche Akademische Austausch Dienst (DAAD, German Academic Exchange Service). They are selected according to performance in their studies and specific motivation for a start of their study year in Canada. Funding includes lump sums for travelling and insurance and a scholarship for ten months, which partly covers the tuition fees.

Students who are back from Canada will write a report for DAAD (to be found on the project homepage www.bachelor-plus.uni-freiburg.de) and inform interested candidates for the following year during a Bachelor Plus Day „Forestry in Canada“.

This incentive for one bachelor year in Canada for forestry students was the first at the University of Freiburg, but meanwhile there are similar ones in other study fields as an internet search shows. It is certainly a very deserving way for promotion of international student's mobility, though for a limited number of students.

The Freiburg Global Track for forestry

- www.bachelor-plus.uni-freiburg.de
- BSc study programme "Waldwirtschaft und Umwelt-ProFI,, (Profilbildung durch Forstwissenschaftliche Internationalisierung)
- programme structure:
 - two years in the BSc-study programme "Waldwirtschaft und Umwelt"
 - one year at a Canadian partner university
 - one more year in Freiburg
- details:
 - courses for preparation in Freiburg
 - studying in English in Canada
 - internship of two to three months in Canada after courses
 - acknowledgement of 60 ECTS credits from Canada in Freiburg
 - the year abroad can be acknowledged as a full year in a subsequent MSc programme in Freiburg
 - seven places per year

Box 2: Basic Information about the GlobalTrack programme at the Faculty of Forest and Environmental Sciences of the University of Freiburg

Of course any initiative to encourage international student mobility must be welcomed. The Bachelor Plus initiative is obviously very attractive for BSc students and is greatly improving the competence of the students who have a chance to participate, as their report demonstrate. But it depends on special funding, which may not be secured forever and is limited to seven students per year. Whether the students will afterwards really only need one year for their Master programmes as they are allowed to time has to show, but certainly the experience to be gained will outweigh this, if not.

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GLOBAL FORESTRY CHALLENGES IN LOCAL CONTEXT: EXPERIENCES FROM A PROBLEM-BASED MODULE

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PELKONEN AND JORMA ENKENBERG**

Abstract

Since 2004, the problem oriented course “Global Challenges in Local Context” has been one of the core modules of the Erasmus Mundus international MSc programme European Forestry. The module has been delivered by the School of Forest Sciences of the University of Eastern Finland. The aim of the module is to develop students’ understanding of the current challenges facing the forestry sector at local and global levels, as well as the fundamental relationships between global and local actions. This paper describes the concept of this course and the experiences in its delivery. Special attention is paid to the most recent edition of the course, providing concrete examples of students’ views on the course and on the use of problem-based learning methods. Based on these experiences, the student-led collaborative approach - with students drawing upon their diverse background and experiences and driving their interaction with various experts - and the global-local orientation of the module are discussed.

Introduction

Problem-based learning (PBL), originating from medical schools, can be defined as the learning which results from the process of working towards the understanding or the resolution of a problem (Barrows and Tamblyn, 1980). In this widely-used student-centred instructional strategy, students aim at solving problems while reflecting on their learning experiences, with teachers taking on the role of "facilitators". Among a great variety of innovative pedagogical and teaching methods (e.g. learning by design, experiential learning), PBL has been identified as a suitable method for delivering a module aimed at addressing global forestry challenges in a local context. The topic has been included as a module of the Erasmus Mundus international MSc programme European Forestry (MSc EF2). The module sought to take advantage of the truly international character of the student group, the enthusiasm of numerous faculty professors and researchers, and the chance of interacting with a great variety of local and international stakeholders located within a short distance from Joensuu (the so-called forestry capital of Europe) in Finland.

² Consortium formed by University of Eastern Finland (coordinating university), University of Freiburg (Germany), University of Lleida (Spain), University of Natural Resources and Life Sciences, Vienna (Austria), Swedish University of Agricultural Sciences (Sweden), and Wageningen University (The Netherlands). Paris Institute of Technology for Life, Food and Environmental Sciences (France) joined the MSc EF consortium in 2010.

Since 2004, this four ECTS credit module has been one of the two problem-oriented courses included in the first-year common curriculum of the two year (120 ECTS) double-degree MSc EF. For the coordinating unit, the School of Forest Sciences of the University of Eastern Finland (formerly the University of Joensuu), taking into account the reform implemented in 2007 to comply with the Bologna Declaration, the MSc EF constitutes the longest running of the current three Masters' degree programmes offered (Figure 1), having enrolled, by 2010, 143 students from 48 different countries.

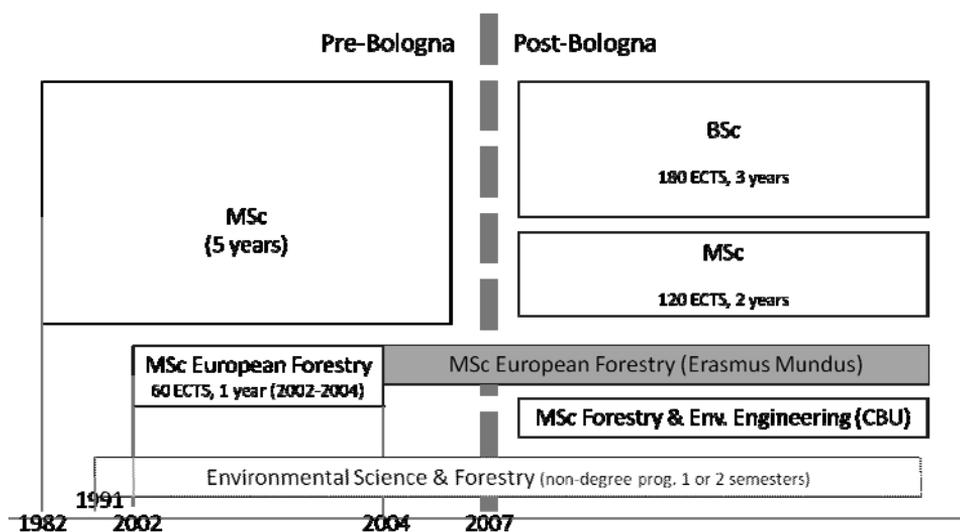


Figure 1: Forestry degrees offered at the School of Forest Sciences of the University of Eastern Finland before and after the Bologna reform. CBU stands for Cross-Border University and refers to the joint degrees organised by Russian and Finnish universities.

Module design

In this module, students act as forestry consultants in order to produce, in small groups (four – five students), a study in which they identify and analyse local and global challenges in a certain area of their interest, suggesting innovative solutions to these challenges. In 2010 these areas were: (1) climate change, (2) bioenergy, (3) multiple-use forestry, and (4) forest policy and economics.

A four-step module was designed (Figure 2), in which the first step was the consultation with the students on their topics of interest prior to the course. On the basis of these interests, decisions on the areas to be studied, the group composition, and the common and area-specific field visits and expert consultations were made by the module organisers. In addition a group advisor was appointed for each

group; these advisors were experts, based at the School of Forest Sciences (UEF), in one of the four topic areas of the course.

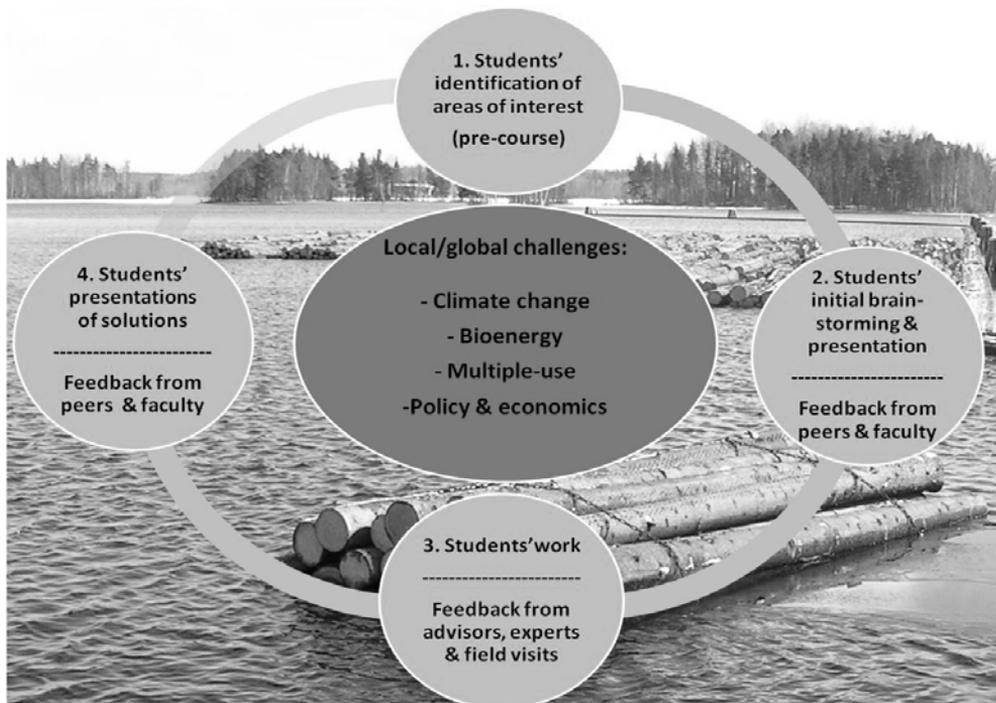


Figure 2: Four-step problem-based module with reference to the feedback provided.

In step 2, and after briefing the students with the aims of the course and the support available, students were asked to work in groups on a preliminary presentation of their current knowledge related to the issues, make a preliminary identification of challenges, formulate their plan to solve the task, and identify what additional support they may need to accomplish the task. Feedback from peers and the faculty was given during these presentations.

Step 3 - the main part of the module - consisted of the students' working on the specified problem. The initiative and responsibility was largely given to the students, who had, in addition to the periodic contact with the course coordinator, the assistance of a subject-specific advisor at their disposal. The idea is to enable the students to identify their knowledge and skill gaps in this area and working together in order to identify methods for attaining the required information. Common institutional contacts and field visits to relevant local and regional forestry organisations were organised to provide the students with a greater familiarity with their work areas (two days), including visits to the European Forest Institute (EFI), the Finnish Forest Research Institute (METLA), the Joensuu Science Park, a Stora Enso logging site, the Enocell Pulp and Paper Mill, and the Eno Bio-Energy Cooperative. In addition, each group could discuss these items during 45-minute sessions with four experts selected by the module organisers. The experts were

selected in order to cover various areas of the topic of the course: providing input on the views of the forest industry, the forest owners, the academia, and political and environmental organisations. Participating students, who received information in advance from the experts, took responsibility over the discussions and recorded their interactions for further analysis.

Furthermore, three to five additional expert consultations were arranged for each of the groups on the basis of their interest and demands, including experts from the UEF, EFI and METLA. The corresponding advisor oversaw the arrangements for such meetings as well as facilitating contacts and guiding the students in finding relevant literature.

The outcomes of the group works were presented in a final session (step 4), receiving feedback from peers, advisors and faculty members. The assessment of the course was based on the preliminary presentation of their work plan and ideas, the report and presentation on the task, in addition to an individual learning report required of each of the students.

Students' views of the module

Students generally expressed their satisfaction with the module as a whole, as well as with the learning methods utilised, which were new for many of the students. As an example, the feedback statement “the study methods provided opportunities for developing my problem-solving abilities” received an average rating of 4.4 in a scale from 1 (strongly disagree) to 5 (strongly agree). The following quotes show some of the students' views on the module:

- “The activities undertaken (...) deepened my understanding of forest management in Finland and my critical thinking on their possible application in the Philippines” (Kathleen, Philippines)
- “I have gained skills in being strategic in asking interview questions and collaborating effectively in a team” (Evelyn, Ghana)
- “Learning from experts, advisor and [student] group can be a better way of teaching than lectures in class. I will use it to organise the teaching at my University” (Charles, Tanzania)

Also abundant constructive criticism on aspects of the module was given, constituting important information on how students perceive the module can be further developed. Examples are:

- “Time was rather short to get really deep in the topic”.
- “A panel discussion [various experts] should also be included”.

Discussion and conclusions

Student-centred approaches to learning are commonly referred to in the educational literature, yet experiences of higher forestry education modules have seldom been reported. The module described in this article adopted the student-centre approach

to such an extent that not a single lecture was included, though it involved the contribution of a great number of experts, academics and researchers. In our view, supported by the students' feedback, this student-led collaborative approach, with students identifying the weaknesses in their knowledge and drawing upon their diverse backgrounds and experiences, as well as the students themselves driving the interaction with various experts to overcome this, is particularly suited for a module addressing forestry challenges with local-global dimensions. This is particularly the case in respect to the need for forestry faculties to respond to the increased pressure they are facing regarding competition, in addition to their role within the changing interests and values with regards to forestry, as well as the needs of the students (e.g. Arevalo *et al.*, 2010).

The contact of small student groups with experts from various local and international institutions is potentially of great value. While such institutions (e.g. EFI, METLA) are found in Joensuu within a walking distance, internet-based meetings could also be utilised when experts are not available locally. An indirect finding is the need to strengthen this sharing of experiences in the development implementation of forestry curricula. This is drawn, as an example, from the fact that students, mostly non-European, had little previous experience of alternative delivery of contents other than lecture based. As forestry constantly interfaces between science and practise, forestry curricula need to provide skills and knowledge for the training of both forest managers and forest scientists (Schmidt and Bartelink, 2006). Problem oriented modules similar to the one discussed here present great potential in responding to these needs.

We suggest there is a need for more discussion and sharing of experiences in designing and delivering forestry modules, especially with regards to innovative learning methods and pedagogics. The inclusion of upcoming trends and developments in educational sciences needs to be considered also by forest educators. As an example, the framework developed by Enkenberg (2010) is provided (Figure 3), which situates co-development, participatory learning and internet as core pillars of future educational developments.

The consideration of students as architects in their own educational processes (e.g. through personal learning environments) as well as the possibilities that the internet offers, especially social media, are suggested as issues for further analysis. Additionally, a greater understanding of what forestry students think of their studies is crucial for the development of forestry education. Because little attention is paid by educational scientists to the comparatively small field of forestry, a greater focus of forest faculties on the development of forestry education will be needed.

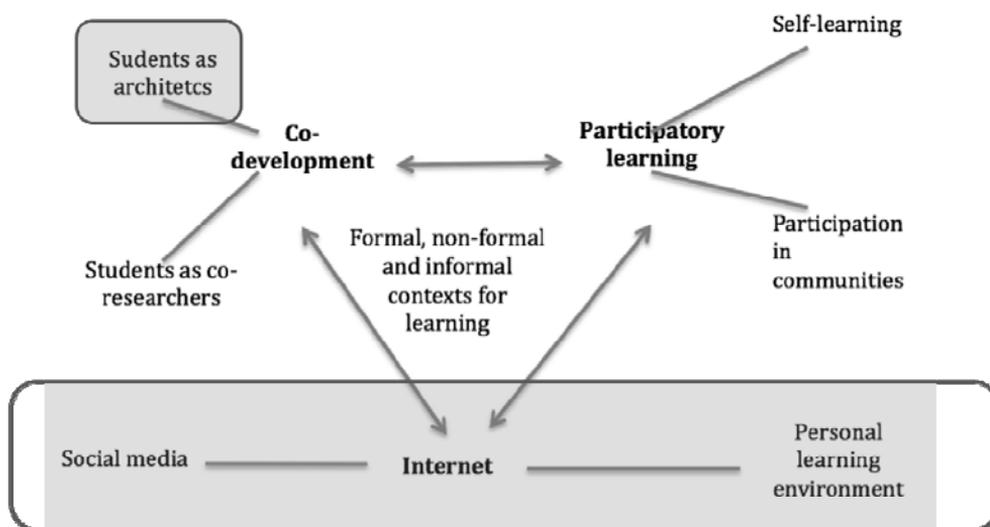


Figure 3: Enkenberg's framework for future teaching and learning environments (Enkenberg, 2010).

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CONCLUDING REMARKS

BACHELOR/MASTER EDUCATION IN FOREST SCIENCES – READY FOR THE NEXT DECADE?

**GERHARD MÜLLER - STARCK, SIEGFRIED LEWARK AND PIETER
SCHMIDT**

Looking back to the presentations and the papers published here in these proceedings, it can easily be seen that this SILVA Network annual meeting is a continuation of its long tradition. Forestry and forest sciences remain part of the university education in all countries, which is changing according to the societal and political demands. The Bologna Declaration triggered quite a number of transformations and changes.

The survey as presented here clearly illustrates both, congruent developments and strongly deviating tendencies: European curricula in forestry related higher education range between three and four years for Bachelors curricula, one to two years for Masters curricula. Even a few of the pre-Bologna, traditional Diploma constellations varying between four and five years are still present and offered to the students. Some universities offer the Masters programme following an undivided curriculum running for five years, others offer a two cycle education with a duration of four years for the Bachelors degree and one or two additional years for the Masters degree. Obviously, the intention of the Bologna Declaration is far from being adopted in a congruent way. As an extreme, it is pointed out in one of the cases presented that benefits of the Bologna process are the exception rather than the rule.

Altogether, these contributions clearly underline the need for an improvement of the current situation. The reality seems do deviate substantially from the expectations which came along with the Bologna Process. In addition to structural discrepancies between different universities and countries, respectively, the point of view of students of the „International Forestry Students Association“ (IFSA) demonstrates handicaps in realising mobility. Opinion polls among students point out deficits which are in contrast to the intentions of the Bologna process. Particularly inflexible regulations, incompatible module structures and absence of advisory boards are frame conditions which counteract shortening of study periods intended in the Bologna Process. Unfortunately, it was not possible to convince the attending students to write a paper on their experiences.

In this situation the question of whether or not respectively to which degree BSc and MSc education in forest sciences is ready for the next decade cannot unequivocally be answered. There is no doubt that education in forest sciences

60 Concluding remarks

needs to be improved. The vivid discussions during this meeting supplied good reasons to be optimistic as the already existing cooperation between higher education institutions increases, as teachers and students together are involved in curriculum development, as mobility aspects are seriously taken into account, and as if chances at the job market have a much higher priority than in the past.

This meeting particularly addressed the benefits and drawbacks of the Bologna Process started in 1999, and demonstrated its uneven and often inconsistent realisation by European higher education institutions. It is possibly a wider problem, exemplified here for forestry and forest sciences education. Obviously, the intention of the Bologna Declaration is far from being accepted in a congruent way. This development affects student mobility and may also affect the chances of the graduates at the job market. The contributions to this meeting and the discussions pointed out ways to solve problems but this seems to be a permanent task.

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