SHOULD ALL FORESTRY STUDENTS LEARN THE SAME? GENERALIST VERSUS SPECIALIST APPROACHES

Editors:
P. Schmidt
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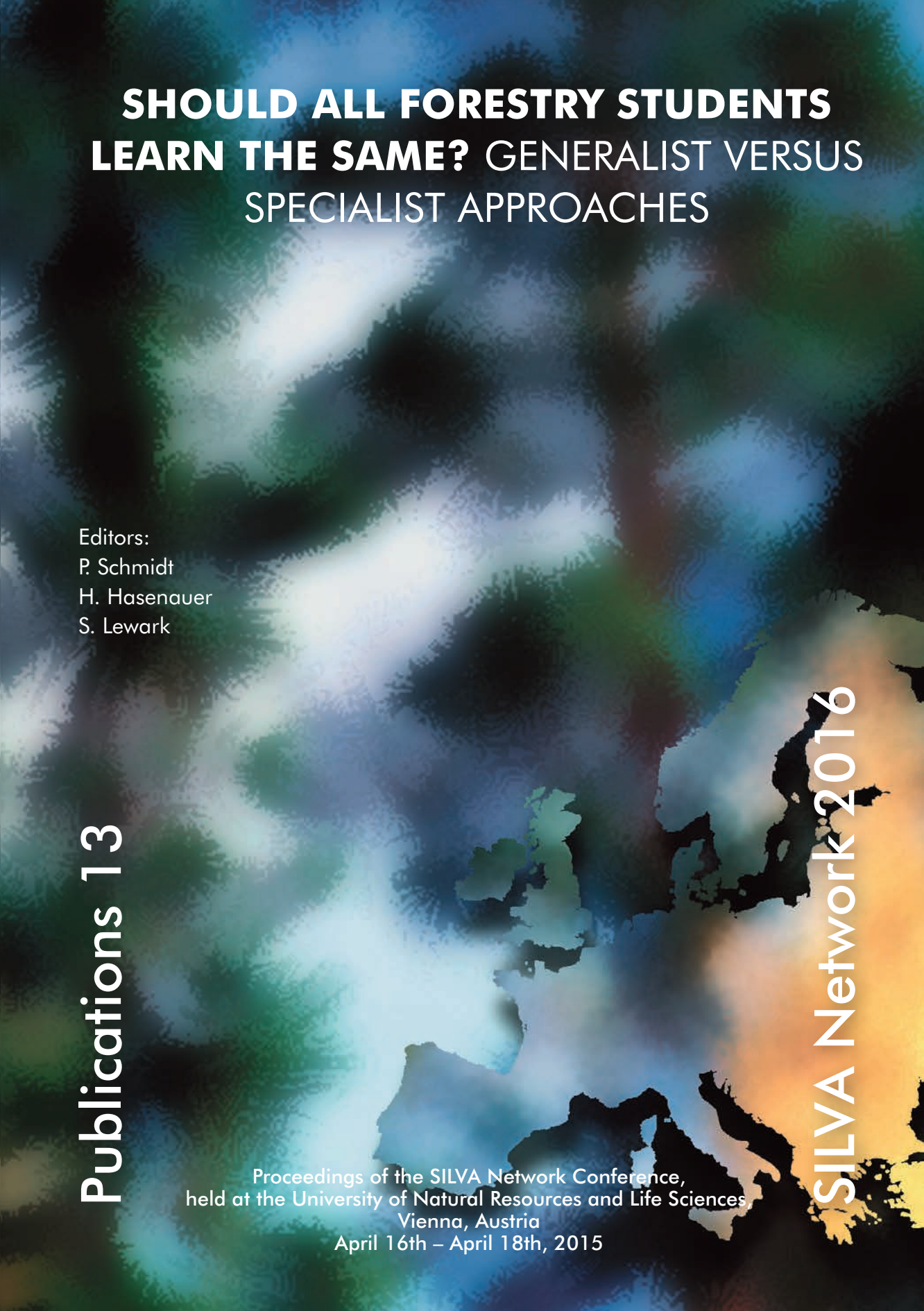

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Proceedings of the SILVA Network Conference,
held at the University of Natural Resources and Life Sciences
Vienna, Austria
April 16th – April 18th, 2015

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PREFACE I

The SILVA Network aims to improve forestry and forest science education through facilitating discussions between teaching institutions, teachers and learners in these fields. The SILVA Network uses mainly two means to reach its aim: annual conferences and the proceedings based on them.

You are reading now the opening page of the proceedings of the Annual Conference of the SILVA Network in Vienna in April 2015. Due to a number of reasons, it was an attractive meeting.

First, in the same week, an ICA-Edu Conference was held at BOKU in Vienna. Moreover, a number of forestry meetings coincided in that week. Members of other forest sciences activity groups and ICA participated in our meeting and members of SILVA Network looked in in other meetings. Coffee breaks at the same time facilitated the cross-over contacts! This resulted in a large number of participants in the SILVA Network's annual meeting and in a sizable number of presentations. The deposit of these presentations can be read in the following pages.

We thank the University of Natural Resources and Life Sciences BOKU for hosting the meeting in Vienna and organising an interesting excursion to BOKU's educative forest (Lehrforst). Thanks and tribute to BOKU and their staff members.

Fifteen papers covering the various topics discussed during the meeting were submitted and reviewed for these proceedings. Thanks to Nobert Weber and Gerhard Müller-Starck for doing a part of the review work and thanks to the authors for their contributions and addressing all review comments. We do hope to see you all next year in Tartu at our next SILVA Network annual conference.

The editors

PREFACE II

Sustainable forest management requires professional and excellent forestry education based on the latest research results. As a result forestry educational programmes were developed and successfully established more than 100 years ago. These forestry educational programmes, in combination with long term research activities and forestry laws, resulted in a substantial increase in forest covered land area throughout Europe during the last decades. This clearly shows that forestry education was extremely successful.

Forests are an important source for renewable resources for a growing bio-economy. They play an important role in the global carbon cycle. Without forests, the CO2 concentration would be about 30 % higher than today, suggesting that forests play a key role in mitigating climate change effects. This important role of forests is the framework for a continuous development and improvement forestry education.

The BOKU University of Natural Resources and Life Sciences, Vienna, considers forest education as a key asset of the University. The permanent improvement of the forestry education by the BOKU University Senate, as the governing body for teaching programmes, ensures that the latest research knowledge is integrated.

An important source for our continuous improvements of forestry programmes is the SILVA Network, since it provides a framework for exchanging experiences and students. These activities are an essential part of the forestry education since there is a strong regional distinction in forestry relevant problems between northern, central or southern European forest management. These regional differences are reflected in the forestry programmes.

The SILVA Network Conference 2015 hosted by BOKU was an important meeting for continuing our collaboration and for sharing the experiences of different forestry programmes. We were pleased that Vienna was selected for the 2015 SILVA Network conference: Thanks.

Univ. Prof. Dr. Hubert Hasenauer
Professor for Silviculture
Chairman of the BOKU University Senate

Participants of the annual conference of the SILVA Network in Vienna in April 2015. Photo Mrs Claudia Becker.

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SUMMARY

SHOULD ALL FORESTRY AND FOREST SCIENCES STUDENTS LEARN THE SAME?

PIETER SCHMIDT

The main theme of this conference was "should all forestry and forest science students learn the same?". Of course this question was embedded in the general attention for university education in these fields. Three texts, one of them from IFSA students addressed this central theme, the twelve others addressed other topics, relevant for forestry and forest sciences education at universities. Two texts concerned competences, four addressed matters regarding curricula, the other six papers covered aspects related to teaching methods. It was a varied and interesting programme.

According to SIEGFRIED LEWARK in his introduction, the central question is not new, see for instance the proceedings of the 2005 SILVA Network Annual meeting in Wageningen (SILVA Network Publications 3). There was – then – "no consensus about content and workload for curricula … and … a strong regional differentiation related to the backyard of the university (e.g. region, country)". Moreover … "there will be no uniformity, but different profiles of curricula in different places, which – with a growing mobility – highly increases the students' opportunities for individual qualification profiles…." Lewark stated that ten years later it is worthwhile to reconsider the balance between core studies and specialization and assess the ongoing developments.

Generalist or specialist approaches

Wageningen University (WU) educated – according to GERRIT EPEMA, SILVIA BLOK and PIETER SCHMIDT – forest and nature managers and scientists for almost one hundred years. Over this whole period, students were allowed to determine a larger or smaller part of their individual curriculum themselves, over the whole period on thesis level, and during the later part also on course level. Contacts with staff changed from a mere personal contact between teachers and students to a more regulated coaching. Students have nowadays to compose their own curriculum in the larger framework defined by WU and have to discuss this with the Programme Director. In the vision of Wageningen University the freedom of the student is a key factor to motivate students to become successful alumni, fitting well in the labour market. As the requirements of the labour market are diverse, not all students should learn the same, which is very well possible in the WU curricula.

System accreditation has been introduced at the Technische Universität München (TUM), Germany, replacing the former programme accreditation. GERHARD MÜLLER-STARCK and MICHAEL WEBER stated that in forest science the main changes in the Bachelor programme (BSc) will be a restructuring of curricula with focus on specific competences, and the introduction of a "mobility window" in order to facilitate studies abroad. The Master programme (MSc) Sustainable Resource Management will be broadened, e.g. by addressing renewable energy sources other than raw materials from agriculture and forestry. Generally, methodological competences will be strengthened.

The flexible curricula at TUM will support both a generalist and a specialist curriculum. Broadly based curricula addressing the generalist perspective still is the major option, particularly responding to the demands of the state forest services. But at the same time, the door is wide open for clearly defined opportunities of specialization in order to respond flexibly to the demands of the job market. Student mobility is an essential element of this concept.

MAGDALENA LACKNER, EVA VON SCHÖNEBECK and MELANIE SCHULTE, representing the International Forestry Students' Association (IFSA), addressed on the basis of two surveys carried out by students this theme too. Forestry students have to acquire competences and knowledges in a wide range of subjects to fulfil the demand for covering a diverse range of forestry related aspects during their future professional career. Today forestry faculties are discussing if schools should aim to specialize on a few topics or if generalization will prepare the students better for upcoming challenges. Questions like "how to define forestry education" and "should all students learn the same" have been raised lately. IFSA tried to find answers to these questions and has carried out two surveys among their network.

Summing up their results, the IFSA students stated that, students want to be specialized and generalized at the same time although it is rather difficult to specialize in most programmes. Still a regional and topic related specialization is important. Moreover they said that students feel well prepared for their working career, but there is a potential in using online classes and social media to amplify knowledge and communication and furthermore close possible gaps of what is required from future professionals and what is taught at forestry faculties.

Competences

During the fall 2014, JAAKKO NIPPALA, MIKA REKOLA, PÄIVI TYNJÄLÄ, and ANNE VIRTANEN conducted ten semi-structured themed interviews with expert representatives of the Finnish forest sector. The findings of this qualitative survey show that in general the role of the university was seen as important, but the possibilities to work for generic skills ("soft skills") were questioned. Subject specific skills were seen as a base and prerequisite for working in the forest sector, but generic

skills and the ability to learn quickly were emphasized as the most important assets. It was noted that learning is increasingly taking place outside the formal education system and this should be acknowledged. Respondents stressed that the most important strength of the university is that it teaches students how to acquire relevant knowledge and to think independently. The societal role of the forest sector was emphasized and it was noted that the university curriculum should be able to provide tools for the students to think about forestry issues from a wider societal perspective. The respondents demanded that practice should be integrated more in the studies through internships and increased co-operation with the business world. All of this creates important challenges for the universities on how to shape curricula and structures of the programmes in order to meet these needs and to be able to improve student´s generic skills while focusing on the relevant subject specific skills.

Critical thinking is a prerequisite to meet the challenges of the 21th century. This states BARBARA HINTERSTOISSER in her contribution. The upcoming and already existing problems ask for innovative ideas, new ways of thinking and acting. As a consequence university graduates, as potential leaders in industry and politics, have to have the ability to get off the beaten track. Profound knowledge, expertise in the field of study are delivered by the universities. A sometimes forgotten but very important task however is to promote critical thinking by our students and graduates to make them aware of how to deal with new challenges. This implies to even allow and motivate them to question what university teachers present. At the universities the state of the art is taught. The next step enters unknown area – for researchers as well as for graduates working outside the university – which has to be stepped in very carefully and thoughtfully. The ability of critical thinking is a basic requirement for these steps.

Curricula

The BOKU declaration for teaching and education contains the following objectives in developing teaching programmes: the teaching must be based on research results, focuses on the learning outcomes and learning processes, and finally the relevant infrastructure needs to be provided. According to HUBERT HASENAUER and SUSANNA-MARIA HENKEL, the implementation principles are based on the three pillars (i) natural sciences, (ii) engineering and (iii) socio-economics. Each BOKU Bachelor study programme must consist of at least 25% and each BOKU master programme of at least 15% of ECTS-credits covering courses from each of the three pillars. This demonstrates the multidisciplinary teaching approach which is typical for all BOKU Bachelor and Master programmes including all forestry programmes. Authors describe both the BSc and MSc programmes. To understand why the content of these programmes is as described, a short overview of Austrian forestry is given.

Traditionally, higher education programmes in Russia were developed to meet the societal needs. According to ALEXANDER ALTAEV, ZOYA YAMPILOVA and ERZHENA IMESKENOVA were the latest reforms in the economic system of the

country followed by a modernization of higher education. Their text informs about the changes in the national educational standards in forestry sciences and also the cooperation with European universities related to Bologna Declaration principles as implemented in Russian universities. The authors examine federal educational standards of the Russian Federation in forestry with as example the Master programme developed and delivered at the Buryat State Academy of Agriculture. Based on the training needs in forestry, a EU co-funded TEMPUS project "Support to vocational training in sustainable forestry: a lifelong learning approach" has been developed and approved for funding in 2014. It is implemented by a consortium coordinated by the forestry department of Lleida University in Spain. The modular curriculum in Sustainable Forestry will be developed with five partner universities in Russia and Moldova.

Green economy creates green jobs, which are decent jobs because they improve all sectors of economy. According to NATALIA KHUTOROVA, the forest sector, including its skilled workforce which is able to implement sustainable forest management, contributes to achieving the social goals of the green economy. Moscow State Forest University (MSFU) holds that university curricula should be modified, so that they include issues linked to the social aspects of forests and forest management, environmental management, and social responsibility. All such 'green' courses can contribute to the transition towards a green economy.
MSFU believes here that it is very important to create a special green module in forestry curricula in academic forestry education. Uniformity is not a necessity, but different profiles of curricula in various universities are possible. Without doubt, universities need and will closely cooperate, even share best practices and promote policies, which are effective, efficient and equitable. Natalia Khutorova describes how MSFU implement these ideas in its Master programmes.

To inform the about 4000 people working in the sector forest and nature management in the Netherlands, the educational system from basic school up to and including university was studied and described by HANS SCHILDERS and PIETER SCHMIDT. Three main pathways can be discerned, the vocational one, the Bachelor (higher professional) one and the Master (scientific) one. Due to many cross-over possibilities build in the system, students can easily switch over and thus – in accordance with their own interests and capabilities – develop an optimal pathway to the labour market. Some future developments are discussed.

Teaching methods

MARK RAYMENT describes how Bangor University is adapting to the changing needs of higher-level forestry students and to the changing opportunities afforded by developments in learning technologies. Increasingly, students are unable, or unwilling, to forgo earning opportunities in pursuit of learning opportunities, and some are choosing to study at Master's level through part-time, non-residential programmes. These students are often already engaged in the forestry sector. Through

a mixture of innovative teaching methods and technology-enabled versions of existing teaching methods, the university ensures a parity of experience between part-time distance-learning students and full-time residential students. Whilst there are costs and challenges in developing and teaching programme components (modules) that "fit" into multiple programme modalities, the university finds that a synergy exists between the two cohorts of students. Part-time non-residential students working in the forestry sector provide real-world context and demonstrate professional standards to the full-time students, and the full-time students provide a fresh perspective and academic energy to the part-time students. Consequently, reported satisfaction from both cohorts of students is higher than that reported for the old style, cohort-focussed predecessor modules.

Within the last eighteen years classical e-learning has become an integral part of teaching and learning at the University of Natural Resources and Life Sciences (BOKU) in Vienna. Smartphones and tablet computers are widely used today, which is why CLAUS RAINER MICHALEK tries to include these mobile devices in BOKU's teaching and learning. Within the scope of a doctoral thesis, in collaboration with the Technical Universities of Vienna and Graz, it is currently examined how mobile learning could be implemented. A first field test with the prototype "BOKU grasp" was carried out in the 2015 summer term course "Harvesting Systems". The results show a mixed picture. While the general acceptance was rather low, those students who actually used the mobile tool did it late at night indoors in their leisure time. The major obstacle did not seem to be the low wireless data connection for mobile phones but the insufficient didactical integration.

Since the reform in 2009, Forestry Schools (16) in Spain provide a very similar 4-year generalist programme in Forest Engineering. In application of the legislation relative to this regulated profession, little room is left to specialization, which is basically restricted to a few ECTS credits during the 4th year. According to CRISTINA VEGA-GARCIA and JORGE ALCÁZAR, specialization is supposed to be achieved at the MSc level, or through lifelong learning (LLL) programmes. MSc programmes are designed for duration of at least a few years, and require accreditation by the Ministry of Education in Spain. LLL programmes, on the contrary, are more dynamic in nature, depend only on the university senate's approval, may involve non-university instructors, and can be structured on different levels, ranging from one-day seminars to Master-level two-year programmes or even longer. As potential students in LLL programmes may be active professional foresters with highly specialized needs, but also professionals or students from other fields of knowledge willing to learn about natural resources management, forestry LLL faces its own challenges in the generalization-specialization spectrum. We analyse here this spectrum of opportunities across universities and forestry organizations in Spain.

Development of a modern system of continuous education is one of the main aims of the state education policy in Russia. This aim is, according to ALEXANDER ALEXEEV, MAXIM CHUBINSKY and OLGA SHAYTAROVA recorded in the draft

"Priorities for the development of the education system in the Russian Federation", developed by the Ministry of Education and Science. Despite the fact that the term “Lifelong Learning” LLL is comparatively new in the Russian educational system, principles of LLL are widely implemented in the educational system, in particular in the Saint-Petersburg State Forest Technical University (FTU). The authors stated that already since 1958 FTU offered advanced professional studies. Nowadays FTU has a number of special institutes engaged in many aspects of LLL, including in five international projects with foreign universities. Constant reforms are, however, necessary to meet the international standards for LLL.

English-medium instruction (EMI) has become increasingly popular in higher education, specifically in forest and environmental sciences. SUSANNE GUNDERMANN sheds light on the challenges of English-medium instruction for students and discusses practical recommendations for quality improvement in EMI programmes. Empirical findings from two years of ethnographic fieldwork in an English-taught Master’s programme at the University of Freiburg indicate that the use of English as a lingua franca in the classroom is neither the only nor the most difficult challenge for students and lecturers. The pluridiversity of the international student body and the local academic culture have far more influence on the learning environment than most people would expect. The resulting implications for EMI practice are that lecturers need to recognize and acknowledge the impact of pluridiversity and of the academic linguacultural habitat on the international EMI classroom. Furthermore, it is crucial that lecturers accommodate their teaching style to the specific EMI conditions instead of merely fostering (or being apprehensive of) their English language proficiency and linguistic performance in the English-taught classroom.

In the course of the Bologna Process “gender equity” has been legally established as a goal for universities throughout Europe, so BETTINA JANSEN-SCHULZ and SIEGFRIED LEWARK in their contribution. Furthermore, “gender” has been accepted by the German accreditation council as a quality related criterion for accrediting all study programmes, thus supporting a ‘”top-down” process. Within the accreditation and re-accreditation processes which have already taken place, universities have considered gender aspects and later on also diversity aspects to varying degrees and have implemented different strategies. Integrative gendering is a strategy for consideration of gender & diversity dimensions in higher education – also in STEM (science, technology, engineering, mathematics) disciplines and forest sciences as a STEM discipline.

Gender & diversity aspects in higher education of STEM should be integrated not only into the content, but also into behaviour and awareness. Gender & diversity related dimensions and knowledge affect the professional skills and the knowledge of the actors in the higher education system.

In the future, university and college teachers not only have to acquire gender & diversity competence, but also have to be able to teach it to others and take it into account in their research. Students of forestry need to obtain these skills, because they will be considered a key competence in their future work. Moreover, establishing gender equity among teachers, researchers and students will bring with it a new realm of aspects and perspectives, greatly contributing to the content in each of these areas. Innovative processes will thus be promoted and the faculty habitus and culture can be changed, leading in the long run to a shift of paradigm within academia and to more women in all status-groups of the STEM disciplines.

The need for gender & diversity competence in the forest based sector and for including gender issues into research and teaching in forest sciences is derived from the observation that forestry is a gendered field of occupation. Examples of including gender issues into forestry study programmes are described.

Conclusion

In his concluding remarks, SIEGFRIED LEWARK asked himself and the reader if the question asked in the conference theme is still an adequate one. As example, he discussed the situation in Germany in the 1990s before the Bologna Declaration. At that moment, the Forest Services were still important customers and would not accept specialization. Universities used other wording to accommodate the upcoming feeling that – nevertheless – a certain specialization would be an important feature for their students. Did Bologna change the situation?

LEWARK formulates a general definition: Specialization shows in special knowledge and skills, which one has, that others do not have – connected with a choice to go for such knowledge and skills, while others choose some other specialization. He sees then
Specialization through choice of thesis or theses;
Specialization through formulations in curricula or content by the universities, which could result in one special curriculum for each student;
Specialization through electives.
Many of these options he finds mentioned in the presentations during this conference and in earlier SILVA Network publications.

Concluding, LEWARK proposes a change in attitude: away from “Should they learn the same?” to “How could we, teachers and faculties, help them in the best way to learn not the same?”. Students are individuals and they will not learn the same.

INTRODUCTION

SHOULD OUR FORESTRY STUDENTS ALL LEARN THE SAME? GENERALIST VERSUS SPECIALIST APPROACHES

SIEGFRIED LEWARK

The discussion about a standard curriculum of forest sciences, e.g. throughout Europe, and about a standard competence profile of the graduates is not new. There was an "undefined consensus", that forest graduates should have a certain know-how to meet the expectations of the forestry sector. With the implementation of the Bologna process, which strongly focusses on learning outcomes and competences, this discussion has gained new attention.

Curriculum development is an ongoing process, strongly driven by enhancements in science and needs of society, but also with courses taken over by new teachers, and resulting in bigger changes, but perhaps more often in smaller steps. However some of the key challenges and questions remain for all forestry Bachelor and Master programmes across Europe:

Typical standard competences versus individual profiles to meet the expected job perspectives of the graduates;

- Subject specific knowledge versus generic competences of the graduates;
- General standard curricula versus specialized programmes addressing the regional needs and strengths of the faculties and universities with forestry study programmes;
- General approaches in the curriculum development: outcome oriented (looking at the competences of the graduates), or based on the scientific disciplines (science driven);
- Definition of the field of forestry: a more narrow application oriented approach versus a wider approach, covering also neighbouring disciplines;
- Learning paradigm versus instruction paradigm.

At the SILVA Network conference 2005 in Wageningen we asked already about the future minimum standards for forest education in Europe at the Bachelors and Masters level, regarding contents and approaches. The conclusion was (Lewark *et al*., 2006): … "*no consensus about content and workload for these curricula like we had in our traditional university and 'Fachhochschule' curricula"*. And about regional differences we stated: *"It should strongly be related to what is considered the backyard of the university (e.g. region, country), which is echoed in the needs of societies. A huge diversity is likely to persist".*

"The importance of the local situation seems to have a lasting impact on both the type of universities and the contents of the academic forestry education. There will be no uniformity, but different profiles of curricula in different places, which – with a growing mobility – highly increases the students' opportunities for individual qualification profiles. The universities will cooperate, even share resources in joint activities like teaching, but they will also compete more than before."

"The individual competence profiles of the graduates depend on the possibility of choosing elective courses or limited specialisations in different lines of studies – …examples ranging from traditional high proportions of compulsory courses to elaborated ways of offering different options to the students…"

Ten years later it seems worthwhile to look again into views on generalist versus specialist approaches, on core studies and specialized programmes and courses and ask for the ongoing developments – which we did with very different examples from a number of universities.

References

Lewark, S., Schmidt, P. and Bartelink, H.H., 2006: Concluding remarks: Forestry education in a challenging environment. Pp. 122-125, in: Schmidt, P. and Bartelink, H.H. (Eds.): Forestry education between science and practice. SILVA Publications, 3.

HOW TO SPECIALIZE:

A STUDENT'S RESPONSIBILITY!

GERRIT EPEMA, SILVIA BLOK, PIETER SCHMIDT

Abstract
Wageningen University educates forest and nature managers and scientists for almost one hundred years. Over this whole period, students were allowed to determine a larger or smaller part of their individual curriculum themselves, on thesis level, or course level. Contacts with staff changed from a mere personal contact between teachers and students to a more regulated coaching. In the vision of Wageningen University the freedom of the student is a key to motivate students and become successful alumni, fitting well in the labour market. Hence not all students should learn the same.

Key words: Bachelor, Master, forestry, nature management, education, free choice, coaching, active students, role of student, role of teacher

Introduction

Regular alumni surveys from Wageningen University (WU) indicate that forestry graduates (till about 2000) and forest and nature management graduates (after 2000) find a great variety of jobs, both inside and outside the forest and nature sector and both inside and outside the Netherlands (Figure 1 and 2). Of all working forest and nature alumni 58% have a job in the green sector, while for alumni after 2000 this is about 65%. Table 1 shows the large variability in fields within the green sector and the variation in jobs for alumni. For more details see Bos-Boers and Schmidt (2010) and Blok *et al*. (2015) and the referred literature.

Forestry and forest and nature management is a broad field and many disciplines are covered: from ecology and basic disciplines like genetics to extraction technology and social and economic aspects; and from inventory and statistics to forest economics and wood science. Many of the people working in the sector have been educated in these programmes. Forest and nature management specialists in these disciplines too were quite often educated in forest and nature management programmes allowing them to specialize.

We will show you how this preparation for a wide variety of jobs was achieved in the past and present by Wageningen University and her predecessors.

Table 1: Alumni of Wageningen University and alumni of its study programme Forest and Nature Management working in the green and in the non-green sector (in %) (data KLV, 2011).

	WU Total	**WU After 2000**	**Forest and Nature Management Total**	**Forest and Nature Management After 2000**
Nature management	6	7	33	42
Forestry	2	3	29	33
Land management	4	5	12	13
Environmental Sciences	3	5	6	7
Recreation	2	2	6	5
Planning	4	3	5	4
Landscape Architecture	2	4	1	2
Total green sector	16	16	58	65
Total non green sector	84	84	42	35

Table 2: Schematic overview of Wageningen University study programmes Forestry 1918-2000. (Th=Thesis; C=Courses)

Period	**Programme**	**Specialisation**	**Free Choice (%)**	**type**	**No. of theses**
1918-1956	Forestry	Tropical Forestry Forestry	20	Th	4
1956-1971	Forestry	Forest Ecology Forest Techniques/ Economy	20	Th	4
1971-1982	Forestry	Silviculture Socio-economy Forest Techniques	20 10	Th C	4
1982-1995	Forestry	Forest Policy Forest Management Afforestation Forest Development Forest products	12 33	Th C	2
1990-2003	Tropical Forestry (MSc)		15	C	1
1995-2000	Forest and Nature Management	For. & Nature Policy F&N Management F&N Development Recreation and Tourism	20	C	3

Forestry programmes at Wageningen University, 1918 till 2000

These years cover the pre-Bologna period, with mainly forestry programmes and forestry graduates. The education in this period is characterized by a limited number of programmes and specializations, with quite a large amount of free choice, especially in the thesis phase (see Table 2). From 1918 till 1995, a forestry thesis, supervised by one of the three forestry chairs (silviculture, forest economics, forest technology) was obligatory, the other theses could be chosen from all the other chairs inside Wageningen University or even - with a good motivation - at another Dutch university. This allowed students to specialize in various (sub) disciplines they liked

most, prepared them well for or were expected to be useful on the labour market at the moment of graduation. The reputation of WU to educate motivated alumni was probably enhanced by these broad possibilities to make their own choice. Coaching of these choices was not or only minimally organised in the first half of this period, but became more and more intensive in the second half. During the whole period, personal contact with professors was an important way of choosing. More information on the programmes during this period can be found in Jansen and Schmidt (2006) and Blok *et al*. (2015) and the referred literature. In 1995 the forestry programme was changed into a forest and nature management programme; see also van Baren *et al*. (1998) and van Baren (2004).

Despite differences in the various programmes, the common denominator is the possibility for a student to make their own choices.

Forest and nature management programmes at WU, 2000-2015

After the Bologna declaration in 1999, the forest and nature management programme was reformulated as a three-year Bachelor and two-year Master programmes (see Table 3). The programmes and courses were rather gradually changed following changes in science, changes in society (nature, ecosystem services, sustainable but money generating resource use like wood for biomass production, exploitation of timber, hunting of animals), programme and course evaluations, remarks by the external advisory committee and changes in the job market. The Bachelor programme is mainly taught in Dutch, the Master programme in English. More information on these programmes are given in Blok *et al*. (2015).

Table 3: Schematic overview of Wageningen University Bachelor and Master programme forest and nature management 2000-now. (C=Courses; Spec=Size of the specialisation).

Level	Programme	Specialisations	Free Choice (%)	type	No. of theses
BSc	Forest and Nature Conservation	Policy and Society Ecology and Management	17 17	C Spec	1
MSc	Forest and Nature Conservation	Policy and Society Management Ecology	15 15	C Spec	1

In the Bachelor programme each student is coached towards and expected to:

- Select a specialisation in the Bachelor (half a year, 30 ECTS credits);
- Select free choice courses (half a year, 30 ECTS credits), the so-called ‘profile’;
- Discuss the choices with the study advisor;
- Gather information on job possibilities, by following career evenings, visit companies and organisations, organised by the programme or by him- or herself;
- The student will do (from 2015 onwards) a personal assessment, and will base his choices in the programme on this assessment;
- Select a Master programme.

In the Master programme each student:

- Is admitted to the Master forest and nature management individually (presently alumni of the Bachelor forest and nature management are admitted automatically);
- Formulates a motivation why this choice for the MSc forest and nature management is made;
- Gathers information on job possibilities, by following a compulsory academic consultancy training, doing an internship of 4 months, and following career evenings;
- Selects restricted optional courses and motivates the choice;
- Selects free choice courses and selects thesis and internship topics;
- Discusses individually the choices with the study advisor, who acts also as a coach;
- Is supposed to do networking;
- Is supposed to do extra-curricular activities in the domain.

If we compare the approach before the year 2000 with the present one, the concept of providing freedom for the student to make his own choices is continued. A difference is that coaching in this process became much more important, indicating that the university feels more responsible that students themselves make well-motivated choices.

Why are the Wageningen University study programmes so flexible?

In the vision of Wageningen University (see WU-Mission, 2015) all study programmes should:

- Have a relevance for society and industry;
- Have an international orientation;
- Be inspiring to students.

In order to achieve this vision, and especially to be inspiring for students, Wageningen University favours and strives for:

- Education in small groups and with activating working forms;
- Approachable staff and inspiring teachers;
- Ample opportunities for students
- To choose an individual learning track;
- To participate in extracurricular activities;
- To develop individual talents;
- To challenge students;
- To participate actively in courses;
- To interact with lecturers and with each other;
- To share responsibilities for the content and the quality of the programmes.

Also in the present strategic plan this line is followed.

Why are the Bachelor and Master study programmes forest and nature management so flexible?

The Bachelor and Master programmes forest and nature management follow the vision and rules of Wageningen University. But according to the programme committee and authors there are good reasons to be flexible:

- The labour market for forest and nature management alumni is diverse and a specific specialization is quite often helpful;
- Next to knowledge and skills in forest and nature management, almost every job requires specific background knowledge and skills, like communication, information technology, ecosystem services. Within a fixed programme it is impossible to teach all students to a high level in all those fields. And also for an individual it is not necessary to achieve a very high level in all disciplines involved.
- Forest and nature management are interdisciplinary;
- Responsibility and the possibility to choose are important to educate motivated students and alumni;
- The business approach of the sector is changing. For instance presently there is growing attention for innovation and entrepreneurship. Students can easily anticipate on these aspects in the free choice.
- Alumni have to compete for jobs inside the green sector worldwide with graduates from other study programmes from the WU, from other Dutch universities and from graduates from universities of applied sciences;
- Alumni should be able to compete for jobs outside the sector, since the possibilities are limited within the sector (see Table 1).

Conclusion: The Wageningen answer to the question

The theme of this volume is ‘Should all forestry students learn the same?‘. Wageningen University has a clear answer to that question and has formulated – possibly from the start in 1918 – its curricula according to that answer: NO, not all (forest and nature management) students should learn the same and YES, all (forest and nature management) students should specialize.

This answer is somewhat generalized. It is not clear if this question was in the earlier years formulated and discussed as explicitly as now. The specialization and choices should also fit in the framework of the learning outcomes. Nowadays both in Bachelor and Master one learning outcome is explicitly formulated as to assure that the student should be able to make their own decisions.

Alumni prove that the concept of flexibility is right: they find jobs in a broad field and in various companies and organisations, as specialist, researcher, advisor, teacher, policy maker, trainee or entrepreneur and in their own country or abroad, using specific skills like communication, GIS expertise or entrepreneurship. The discussion which one was first (the flexibility in the programme or the broad range

of jobs) has a high chicken or egg problem content. Which one was first is not important, that it exists is important.

Quite clear is also that the individual study programme as it is presently formulated in detail is a responsibility of the student coached by the university. The fact that recently the role of the study advisor was given more weight and that the tasks of the student and the study advisor were more strictly formulated indicates that WU takes this aspect seriously.

This flexibility requires a careful design of the programme and a check by an independent examination committee. For the potential employer the diploma supplement is informative. In addition to the programme and specialization, all courses, including thesis and internship, are described, including an explanation of the marks in the ECTS system.

Individual study programme should contain enough of forest and nature management disciplines and identity to make the student a true forest and nature manager. All learning outcomes have to be achieved. Moreover, based on his individual study programme, alumni should be able to compete for a job on the European labour market inside the green sector and especially inside the forestry and nature management sector. They also should be able to compete with graduates from more narrow disciplinary programmes like biology or social sciences. Here the study programme committee and the study advisor have to be and remain alert.

We believe that in this flexible way we educate forest and nature managers at a high level, who are able to find suitable and attractive positions in an ever changing society.

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FLEXIBILITY OF CURRICULA ALLOWS BOTH GENERALIST AND SPECIALIST APPROACHES: BSC AND MSC AT THE TECHNISCHE UNIVERSITÄT MÜNCHEN

GERHARD MÜLLER-STARCK AND MICHAEL WEBER

Abstract
System accreditation has been introduced at the Technische Universität München, Germany, replacing the former programme accreditation. In forest science, the main changes in the Bachelor programme (BSc) will be a restructuring of curricula with focus on specific competences, and the introduction of a "mobility window" in order to facilitate studies abroad. The Master programme (MSc) ´Sustainable Resource Management´ will be broadened, e.g. by addressing renewable energy sources other than raw materials from agriculture and forestry. Generally, methodological competences will be strengthened.

Flexible curricula will support education of both generalists and specialists. Broadly based curricula addressing the generalist perspective still is the major option, particularly responding to the demands of the state forest services. But at the same time, the door is wide open for clearly defined opportunities of specialization in order to respond flexibly to the demands of the job market. Student mobility is an essential element of this concept.

Keywords: BSc, MSc, forest science, curricula structure, electivity, generalist, specialist, student mobility, job market.

Introduction

In 2014, the Technische Universität München (TUM) obtained the status "System accredited". All faculties were involved in a stringent quality management. Consequently, the former status "Project accredited" of the "Studienfakultät für Forstwissenschaft und Ressourcenmanagement" (Study Faculty of Forest Science and Resource Management) is no more valid. Now the evaluation of bachelor and master curricula is done in dialogue with the TUM quality management. Although the internal discussion is not yet finished, major outcomes are evident, for instance the increase of flexibility of curricula by offering a broad palette of basic and applied modules, and also of very specific modules. Increasing flexibility is the driving force for the reorganization of both, bachelor and master curricula.

Another focus is the mobility of students. The replacement of the Diploma curricula by two consecutive academic degrees, i.e. BSc and MSc, affected students' mobility in two ways: it formally offered mobility by opening various opportunities to

supplement the acquired BSc degree by a MSc degree abroad. In contrast to this new dimension of flexibility, students´ mobility within BSc curricula decreased considerably (e.g. Ziesak and Müller-Starck, 2014) and flexibility diminished due to the declining portion of elective fields and subjects, respectively. The major reason for these trends is that BSc curricula were derived from the former Diploma under the condition of a substantial reduction of the study period, at least by one year. Consequently, student workloads increased considerably in most cases, so that BSc curricula started suffering from compression and corresponding regimentation. Students´ mobility decreased considerably because students risked an involuntary prolongation of their studies in case they wanted to study one term abroad. Suggestions were made to overcome these restrictions (e.g. Müller-Starck *et al*., 2015) but the situation is still inadequate. This is the major reason why the current reorganization of the BSc curriculum provides a "mobility window" for those students who want to include studies abroad in their BSc curriculum.

The Bachelor curriculum "Forstwissenschaft und Ressourcenmanagement" (Forest Science and Resource Management)

Previous modifications of this BSc curriculum particularly responded to demands of the job market by trying to balance academic freedom and "practice orientation" (Weber and Müller-Starck, 2016). In continuation of this process, the focus of the current revision is the compaction of curricula in two ways:

- Courses in basic sciences are offered jointly to all students of different study faculties (most likely held by specialized lecturers).
- The number of compulsory elective courses is reduced. Students elect 3 out of 4 major fields of concentration. Corresponding teaching modules will address closely related subjects with only one examination per module.

Generally, modules became more consistent by focusing on specific competences (see Figure 1). Fragmentation of some disciplines over several modules will be revised successively. For instance, "Forstgenetik" (Forest Genetics) was part of the modules "Biology 1" and "Biology 2" and is now assigned to the module "Silviculture". The module "Criminal, civil, public and employment law" covers all relevant aspects of legislation. Its subjects are no longer associated to different disciplines, such as employment law or ergonomics or process technology.

Concerning structure and partition of credit points, the revised BSc curriculum as shown in Figure 1 does not differ substantially from the previous one (for details see Weber and Müller-Starck, 2015). However, a remarkable difference is the way mobility is provided for:
The 6^{th} (last) term is dedicated straight forward to student mobility in order to stimulate students to spend this term (or part of it) abroad without an involuntary prolongation of studies. The use of this "mobility window" is facilitated because the newly introduced examination module (Prüfungsmodul) which covers terms 4-6, is counting for a workload of 150 h or 5 CP. The corresponding shift of the examination

period leaves time enough for preparation, so that students who studied abroad will not be discriminated against.

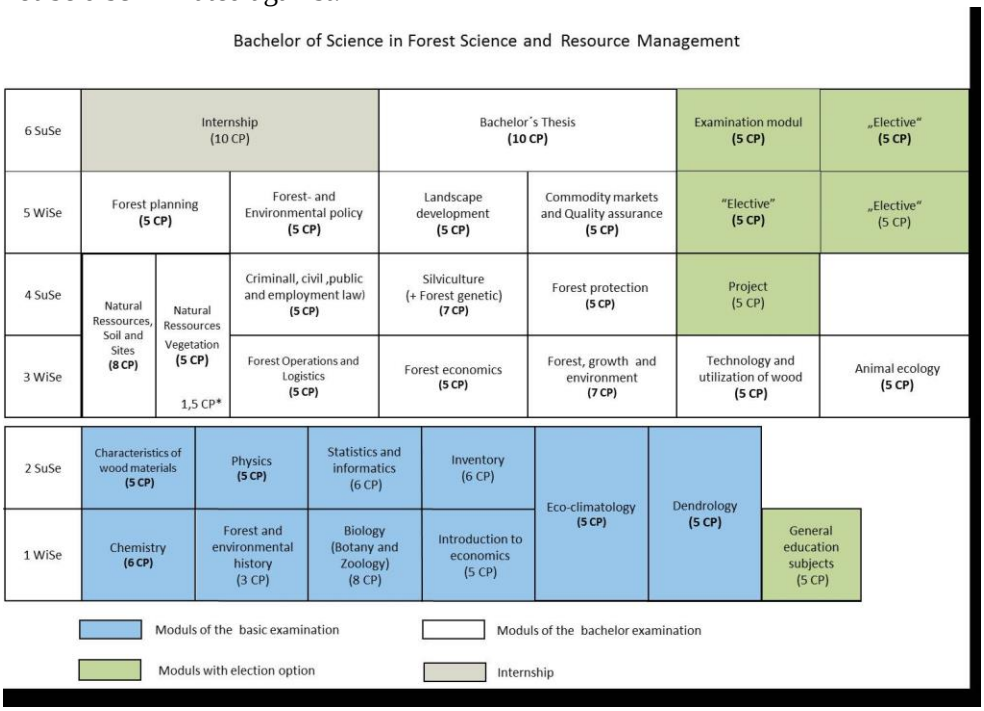

Figure 1: Revised version of the BSc curriculum "Forstwissenschaft und Ressourcenmanagement" (Forest Science and Resource Management). Duration is six terms, each with 30 credits (CP = 30 working hours for a student) on average. "SoSe", "WiSe" stands for summer and winter semester, respectively, "modul" for module.).

As indicated in Figure 1, the 6th term consists of 4 elements, the first three of which can successfully be completed abroad:

- "Praktikum" (internship, 10 CP);
- Bachelor´s thesis (10 CP) + "wissenschaftliche Methoden" (scientific methods, 1 CP);
- "Wahlfach" (elective subject , 5 CP);
- "Prüfungsmodul" (examination module, dedicated to the preparation for examinations, 5 CP).

This structure can help to overcome substantial deficits regarding the student mobility targets of the EHEA (European Higher Education Area) Ministerial Conference 2009 in Leuven and Louvain-la-Neuve: „In 2020, at least 20% of those graduating in the EHEA should have had a study or training period abroad" (Bologna Process 2020, topic 18).

Altogether, the arrangements of the current revision are expected to improve the flexibility of the BSc curriculum "Forstwissenschaft und Ressourcenmanagement"

particularly due to the broadening of courses in basic sciences, the eligibility of courses, and the increase of chances to include studies abroad.

The Master curriculum Sustainable Resource Management

This MSc curriculum consists of four terms, where the last is dedicated to the Master´s Thesis (see Figure 2). All courses are held in English.
Analogously to the BSc curriculum, students can spend the last term (or part of it) abroad. In addition, the following measures were taken in order to increase the flexibility of the MSc curriculum:

- The interdisciplinary concept is reinforced, e.g. in case of renewable resources: courses related to renewable energy will put more emphasis on non-matter sources such as wind and solar energy.
- Curricula were condensed analogously to the BSc curriculum, i.e. by replacing compulsory courses by a limited number of major "Fields of Concentration" (2nd term, see Figure 2), out of which students will individually select a defined number.
- Students will have more opportunities to select courses (e.g. 3 out of 4).
- Methodological competences will be strengthened, e.g. by means of including planning and modelling tools.
- Fragmentation of some disciplines into several modules will be revised. Specific competences will be focused.

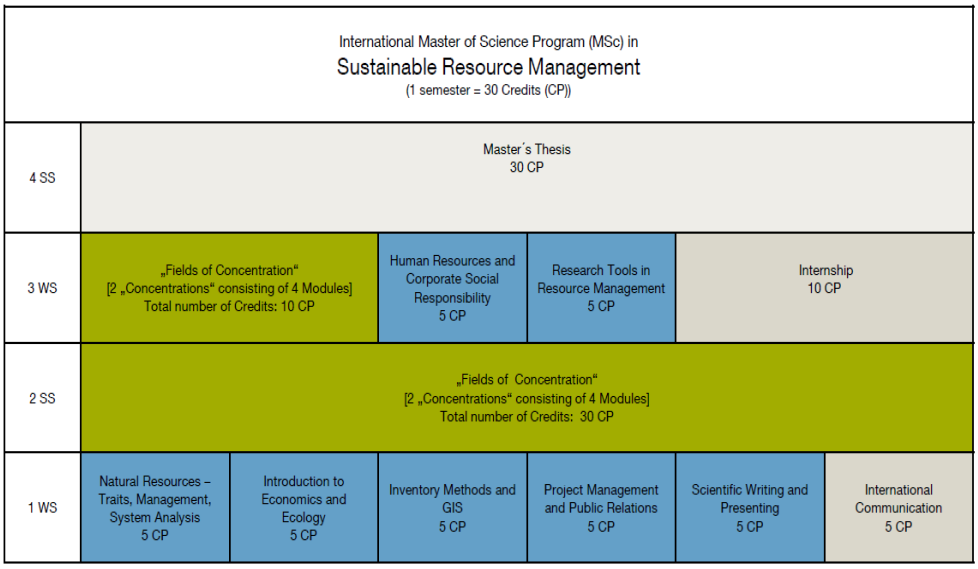

Figure 2: MSc curriculum Sustainable Resource Management. Duration is 4 terms, each with 30 credits (CP) ("SS", "WS" stands for summer and winter semester, respectively).

Conclusions

Flexibility of BSc and MSc curricula should not exclude conventional pathways of study in forest related higher education. Broadly based curricula addressing the generalist perspective still is the major option, particularly responding to the demands of the state forest service. But at the same time, the door is wide open for clearly defined opportunities of specialization in order to response flexibly to the demands of the job market. In addition, student mobility in terms of studies abroad is looked at as a powerful tool to increase flexibility of curricula, to respond flexibly to the demands of the job market, according to the targets of European higher education.

In case of the BSc curriculum "Forstwissenschaft und Ressourcenmanagement" of the Technische Universität München, system accreditation and subsequent revision resulting in a broadening of courses in basic sciences, a general increase of consistency of modules, thus focusing specific competences, and supported higher degrees of eligibility of courses. The "mobility window" which is now explicitly integrated into the last term of the BSC curriculum is a new feature which appears as a very useful additional element of flexibility.

The MSc Sustainable Resource Management shows similar tendencies with regard to the increase of flexibility as the BSc curriculum. Main focus is the consolidation of the interdisciplinary concept and the strengthening of methodological competences. The "mobility window" is linked to the Master´s thesis which allows studies abroad and thus the inclusion of topics outside of the current curriculum. However, as 80% of the students in this programme come from abroad additional international mobility is of lower importance.

In both, BSc and MSc curricula, flexibility and thus the chance for specialization and effective response to the demands of the job marked is offered, not at the cost of the generalist´ perspective.

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SHOULD ALL FORESTRY STUDENTS LEARN THE SAME?
A STUDENTS' REVIEW OF THE CURRENT SITUATION

MAGDALENA LACKNER, EVA VON SCHÖNEBECK, MELANIE SCHULTE

Abstract
Forestry students have to learn a wide range of subjects to fulfil the demand for covering a diverse range of forestry related aspects during their future professional career. Today forestry faculties are discussing if schools should aim to specialize on a few topics or if a generalist education will prepare the students better for upcoming challenges. Questions like "how to define forestry education?" and "should all students learn the same?" have been raised lately. The International Forestry Students' Association (IFSA) tried to find answers to these questions and some more and has carried out two surveys among their network. The article refers to those questionnaires and tries to answer the question of the conference theme from the students' perspective.

Keywords: forestry education, curricula, generalist, specialist, student survey

Introduction

The forestry sector in Europe needs professionals with a broad educational background, addressing forest ecosystems as well as social sciences issues. Programmes make specialization in topics like forest ecology and silviculture possible as well as in forest policies. But while forests differ widely through natural (ecological) differences, educational programmes have to m*eet al*l the diverse demands on forests by societies. Current curricula struggle with relevance, innovative approaches and a lack of general understanding for the importance of the ecosystems of forests. The high demands of society have to be fulfilled by up-to-date programmes, developed in a participatory process with the involvement of researchers, educators, students as well as industry. The discussion of standardized programmes and internationally normalized curricula is already a long lasting one.
While these discussions are still ongoing, IFSA carried out two surveys among their members in 2015. The aim was to learn more about the perspectives of students on their situations at universities, their interests on possible specializations, todays' teaching methods and about much more.

The first survey outlines the preferences of students for standardized programmes or individual curricula. This survey focused on European students only, and was carried out as preparation for the SILVA Network Annual meeting. The objective of the second survey was to illustrate the students' general situation internationally.

Questions on financial situation, focus of studies and wishes for changes within their universities have been asked. The analysis of these surveys was presented during the SILVA Network Annual Meeting in Vienna. It highlighted the students' point of view in the ongoing discussions about standardization and relevance of forestry curricula.

Survey 1 – a generalist versus a specialist education

The first survey was carried out within the network of IFSA. European students were asked to answer to 23 (see Table 1) questions online to find answers to the question of the conference theme of this years' SILVA Annual Meeting "Should all forestry students learn the same?". In total, 32 students from ten European countries participated. Two thirds of the participants were female. About one half of the participants was enrolled in a Bachelor programme, the other half were graduate students. The majority of the students were in their third, fourth or fifth year. The participants came from following countries: Germany, Poland, Austria, Italy, Estonia, Finland, Latvia, Romania, Slovenia, and Spain. The students had diverse backgrounds of study programmes, e.g. forestry in general, forest engineering or resource management. The answers of the surveys represent a small number of forestry students and cannot be interpreted as the general view of forestry students globally. Aim of the first survey was to give a rough overview and to investigate on the theme of the conference within Europe.

Table 1: Questions in survey 1

Gender
Age
Level of education
Year of studies
Title of study programme
Country, name of university
What is your current field of interest in forestry? Which topic are you most excited about?
Has that interest changed since you started your studies?
If YES, was this because of a particular course during your studies?
Do you have a future career goal and know already the field you want to work in?
Has your career goal changed since you started your studies?
How would you rate the average job chances in the field of your interest/future career goal?
How much has this (job chances) played a role in choosing your direction of studies?
What do you think is most important for finding a job after your graduation?
Do you feel your current study programme provides you with enough opportunities to specialize in the field you are interested in?
How would you rate the ratio between elective and fixed courses in your study programme?
How easy/hard would you say is it to shape your studies according to your personal interest?
Does your university has a specialization and field that it is renown for?
If yes which one?
How much did this specialization of your university influence your selection of university?
The title of this year's Silva Network Conference is "Should all forestry students learn the same". Would you agree to have standardized forestry curricula in Europe?
Why? /Why not?
Is there anything left that you would like to add regarding the survey or topic that you feel would be important and/or valuable for us to know?

One question was, if students think their programme was more general or special oriented. About 50% answered that their programme could be described as rather general, 37% considered it as general and specialized and 23% said specialized. 3% did not answer to this question. Another approach was to compare the name of programmes. This has also shown a remarkable diversity.

Most of the students were interested in forestry management and silviculture, followed by conservation management, forest policy, forest growth, water management, wood industry, agroforestry, wildlife management, forest economics or other.

Furthermore, the participants were asked whether they changed their main interest during the study programme or not. Three quarters indicated that they changed their interest. Half of these students mentioned it was because of one specific course.

Conclusion from survey 1
Most study programme titles reflect the general nature of programmes while others are general with a specialization in one field. Interests of students change over time and during studies, depending on study courses, therefore students put more emphasis on quality of courses. Furthermore job chances are perceived as average by students, but are considered as important to decide to study forestry. Therefore a better communication of job chances to future students is required. Summing up, students want to be a specialist and generalist at the same time although it is rather difficult to specialize in most programmes. Still a regional and topic related specialization is important.

Survey 2 - global forestry students' education survey

This survey was conducted to receive an overview of the state of forestry curricula worldwide. The questions asked are given in Table 2. In total 261 students participated. A gender balance was given (48% male). The participants were from the seven regions, IFSA is divided in: North and South America, Northern and Southern Africa, Asia-Pacific, Northern and Southern Europe. Over 40% of the answers were submitted online by European students. Almost all European participants were enrolled in standard forestry courses (93%). The other 7% were enrolled in diverse programmes such as resource management, environmental sciences or forest industrial engineering.

One of the questions was how students perceive the job opportunities after their studies. Almost 40% considered their chances to find a job right after their studies are "okay". About 50% of students from Northern Africa perceived their job opportunities as "very good".

Table 2: Questions in survey 2.

Age
Level of education
Gender
Region
Course of studies
Focus of studies
How do you perceive the job opportunities in your field of specialisation in your home country?
Working time (in hours) for university per week
Extracurricular activities
Do you pay university fee?
How would you describe your financial situation?
Have you ever studied or worked abroad?
If yes, why?
If no, why not?
If your home university offers international programmes or courses are you satisfied with the programmes offered?
Have you ever participated in an online class?
Do your teachers use social media to get connected to the students?
If yes, please specify ...
If I could change something at my university I would change ...
Do you have ideas how IFSA can contribute to improve forestry education on a global perspective?

Furthermore the students were asked if they were satisfied with the international programmes and courses at their university. Half of the students said to be content with the international opportunities their universities offered in Europe. In South America only about 20% were satisfied.

The survey also included questions concerning the use of media channels of faculties, as offering online classes in their study programmes. About 70% of the European students never participated in online classes. Another question was if their lecturers or teachers were using social media to get connected to the students. In Europe, only 17% of the lecturers were using social media. In the Asia-pacific region this number is slightly higher with 37%.

But on the other hand, many students from both regions use social media to discuss university related topics (73% in Europe, 48% in the Asia-Pacific region).
The last question was what participants would change at their home universities, if they could improve something. In Europe the most frequent answer was that students would appreciate more practical work during the studies. Moreover, they would prefer educators to use more modern teaching methods or improve the teaching quality of the lectures and they would like to have more and better possibilities to study abroad.

Conclusion from survey 2
The overall outcome of this survey is positive. Of the participating students, 40 % ranged their job chances good to very good. This could be interpreted as satisfaction with the learned knowledge and the overall feeling of being well prepared for the professional life. In some areas there is potential for improvement. Only half of the

students are content with the internationalization of their study programme. As international experiences and a knowledge on global processes is gaining in importance, this lack in offering international courses can be seen as one reason for decreasing attractiveness of forestry programmes.

The number of students participating in online classes is still low. There is a great potential in increasing this number and to raise awareness for the diverse (free) online courses available. Additionally the use of social media to connect with students could be improved as well as the quality of teaching.

In general it can be said, that students feel well prepared for their working career, but there is a potential in using online classes and social media to amplify knowledge and communication and furthermore close possible gaps of what is required from future professionals and what is taught at forestry faculties.

FUTURE COMPETENCE NEEDS IN THE FOREST SECTOR AND THE ROLE OF UNIVERSITY – REVIEW OF FINNISH FOREST SECTOR PROFESSIONALS

JAAKKO NIPPALA, MIKA REKOLA, PÄIVI TYNJÄLÄ, ANNE VIRTANEN

Abstract

During the fall 2014 ten semi-structured themed interviews were conducted with expert representatives of the Finnish forest sector. The findings of this qualitative survey show that in general the role of the university was seen as important, but the possibilities to work for generic skills ("soft skills") were questioned. Subject specific skills were seen as a base and prerequisite for working in the forest sector, but generic skills and the ability to learn quickly were emphasized as the most important assets. It was noted that learning is increasingly taking place outside the formal education system and this should be acknowledged. Respondents stressed that the most important strength of the university is that it teaches students how to acquire relevant knowledge and to think independently. The societal role of the forest sector was emphasized and it was noted that the university curriculum should be able to provide tools for the students to think about forestry issues from a wider societal perspective. The respondents demanded that practice should be integrated more in the studies through internships and increased co-operation with the business world. All of this creates important challenges for the universities on how to shape curricula and structures of the programmes in order to meet these needs and to be able to improve student´s generic skills while focusing on the relevant subject specific skills.

Key words: Forestry, society, employer's view, generic skills, specific skills.

Introduction

The emerging bioeconomy is setting new demands for the competences relevant in the forest sector (European Commission, 2012). Forest industry has been going through transformation from traditional product orientation towards services marketing. Furthermore, different actors are increasingly facing pressures to take into account various stakeholder needs. Nowadays the work of forest professionals is more dealing with people than with just trees, thus they need to manage with the expectations of the general public more than before (Rekola *et al*., 2010). Emerging technologies and changes in the nature of work are also posing challenges for developing competence, which stresses the need to build the human capacity to support this development (Piva *et al*., 2005). The role of formal education as a provider of competence is challenged, and competences relevant for employment are increasingly learned outside the formal education and also throughout the career.

Some competences will become less relevant, while others will become more important (García-Aracil and Velden, 2008). It has been suggested that generic skills (also known as "soft skills" or "transferable skills"), such as social and communication skills or time management skills, will become more important in the future (Tynjälä *et al*., 2006; Andrews, 2008). This has been recognized in the forest sector as well (Schuck, 2009; Kilpeläinen and Lautanen, 2014).

Aforementioned changes and trends in work competences have raised concerns about the match between higher education and employment of graduates in general (e.g. Teichler and Kehm, 1995; Hejke *et al*., 2003; Hoogveld *et al*, 2005; Tynjälä, *et al*., 2009; Tynjälä and Gijbels, 2012; Virtanen and Tynjälä, 2013; Tynjälä and Newton, 2014) and in the forest sector in particular (Arevalo *et al*., 2010). A proper match between the education of future professionals and work-life is needed.

The following research questions were guiding the study:

- What kind of future challenges and trends are forest sector professionals with higher education expecting, and what kind of competences would be required to meet the challenges?
- How do forest sector professionals see the university´s role in learning work life competences?

Data and methods

Data was collected, as a part of wider study about Finnish forest sector competence needs through semi-structured in-depth interviews **of ten representatives of different forest sector organisations** in the fall 2014. Respondents were recruited from the workshops organized at the beginning of October 2014 on the subject of further education and lifelong learning in the field of forest sciences. Some respondents were also recruited through the researchers' own networks. The target group was Human Resources and/or Development professionals in various organisations. The emphasis was given on the distribution of respondents around the most influential organisations, different sizes of organisations, and private / public sector background. There were both governmental (4) and private (6) organisations represented in the study. Out of 10 respondents two represented small and medium-sized organisations (less than 250 employees) and the rest were from larger organisations. The overall goal was to gain as representative picture of Finnish forest sector as possible. The interview length varied between 30 minutes to one hour.

Results

The future of work in the forest sector and relevant competences

The future of work life in the forest sector and relevant competencies were investigated in order to gain understanding of the future needs in the field of forest education. The results on this section provide implications on what kinds of competences and attitudes future students could benefit from. The following three

themes emerged as dominating future trends in the forest sector: 1) Technological changes: increasing mobility, automation, and technology as an aid for work, 2) Organizational changes and uncertainties, and 3) Changes in the need of competences. In the following some extracts from the interviews are used to illustrate how the interviewees discussed the themes.

> *"Working does not necessary need a physical space and you can basically work wherever. The connection is very much online all the time. Sometimes you have to be able to close all the devices and start thinking about something else than just the constant flow of information. Overall I think this could happen really fast. Five years from now everything will be very automatic and you just follow the information or type in to the computers what you want to acquire and it produces the information." (Respondent #1)*

Here the extract is considering the technological changes as increasing mobility so that the necessary need for physical space will diminish. Automation and technology as an aid was also strongly stressed and high expectations expressed for computer systems in terms of relevant information production.

Organizational changes and uncertainty due to this was noted in many responses. The respondents explained that while in the past the permanent position was perceived important, nowadays work is seen more as projects, and it is common to change employers frequently. The following respondent put it in a strict way:

> *"There is no such thing as permanent position anymore. There are just positions until further notice." (Respondent #7)*

As regards to the competence need changes in the forest sector the respondents identified several skills and knowledge important in the future. Especially, they emphasized the importance of generic skills. The attribute most often mentioned was that of self-awareness. This development emphasises the need for self-awareness of the employees of their competences. It is important for the employees to be able to recognize their own strengths and weaknesses, as well as what is the most suitable and effective way for them to work. One of the respondents described this in the following way:

> *"How are you going to sell yourself if I have to tell you tomorrow that there is no more work? How will you sell yourself to the next employer?" (Respondent #8)*

Besides self-awareness, the respondents emphasized the importance of several other generic skills, such as mobility, learning skills and motivation, leadership and time management skills, co-operation and communication. The future work life was seen as more and more fragmented, thus demanding more skills of this sort from the employees. In the following quotations the respondents discuss these skills.

"You have to be well organized. If necessary, you close down all the phones, ignore the e-mails, close all the programmes so that no one is able to disturb if you have something urgent that needs to be done. The person has a responsibility to be able to determine when you are ready to receive external signals and when you are not." (Respondent #6)

"One important thing would be to be able to leave time for thinking. Meaning that, if you have your calendar full all day, every day, having several meetings a day, it might not be the best possible solution. That you should be able to think about things and have conversations with the colleagues and that way solve problems and gain understanding on the issues at hand. And how should we take care of this situation in the best possible manner." (Respondent #1)

In addition to the generic skills described above, subject specific knowledge was also brought up in the interviews. However, perhaps forest sector substance knowledge was seen so self-evident as a prerequisite for success in the profession that the respondents focused more on other skills and attributes.

Learning competences: the role of the universities

The role of the universities in developing future competences was discussed by the interviewees in terms of the three following themes: 1) the traditional task of university, 2) the development of generic skills, and 3) the relationship between university and society. This section of the results provides more information on the actual role of the university in focusing on the skills and attitudes described in the previous section.

The traditional mission of university, to develop scientific thinking in students, was expressed in several ways in the interviews. Many of the respondents emphasised this as the greatest strength of the university. The development of critical thinking and the ability to learn and to outline large entities were thus seen as most important tasks of the university, which is not surprising.

"I would see that most of the traditional emphasis of the university teaching, such as independent and critical thinking, and ability to learn to solve problems independently, is very important. And that has probably been one of the main things in the university for a very long time." (Respondent #5)

"If you think about the advantages of the university graduates and what the employees should have more in general, is that you would have an ability to react on the information and create a synthesis. You have to have a skill to learn fast." (Respondent #6)

The respondents expressed contradictory views about the development of generic skills. On the one hand, as described above, some interviewees stressed the

universities' task of developing generic skills such as thinking and learning skills. On the other hand, some criticized the recent movement towards generic skills and suspected universities' possibilities to lead the students to get these skills.

> *"These* ***so called generic skills should be taught at home already****. I would say that* ***for the university to start teaching these would be quite an impossible and desperate task.*** *After all we are all adults, not lads." (Respondent #10)*

It seems that the meaning of the concept of generic skills was different for different respondents. In the quotation above the interviewee may have thought about social skills when criticizing the focus on generic skills in the university. In some other comments critical thinking skills traditionally regarded as important in university education have been included into generic skills while some respondents may have regarded these skills as 'academic' skills instead of 'generic' skills.

Multiple respondents brought up the third theme related to universities' role in developing future competences, the relationship between the university and the society. One of the respondents emphasised that forest sector cannot function outside society and that this emphasises the need for interaction and communication skills as well as knowledge and understanding of the societal processes. In the responses, practicality was called upon on the university teaching. Also the internationality and globalisation were seen as important issues in the future. Even if the field of work would be domestic, environmental issues are interconnected globally and thus the knowledge of what goes on elsewhere was seen important.

> *"I would see that the* ***social aspects should be clearly emphasised*** *in the university education. The fact that we are social actors and that we should try to understand people´s expectations." (Respondent #1)*

> *"This is definitely not that kind of field where we would be acting only within one country´s borders. There is climate change, poverty reduction, all kinds of development cooperation projects and so on.* ***That means that even those that do not want to work internationally have to know the global picture****." (Respondent #2)*

All in all traditional academic strengths of the university were emphasised, but at the same time it was stressed that the universities should work in a close collaboration with the forest sector and the outside world.

Discussion and conclusions

Our findings showed that the Human Resources and Development professionals in the forest sector expected several future challenges as regards to work in the sector. Traditional ways of working are making way for more flexible ways to work. This can be both due to changes in the nature of the labour market but also because

attitudes of the employees have been changing as well. Generally speaking, this corresponds with the trends identified in other sectors and studies by different organisations (see for example Confederation of Finnish Enterprises 2014). Increasing amount of information, use of mobile technology, organisational changes and uncertainty set important requirements for the future employees, such as self-awareness of one´s own competences and working habits. Project-based employment relationships challenge the individual's responsibility of keeping competences up to date and relevant. This has also been recognized in the study about Finnish forest professionals' current and future skills by Kilpeläinen and Lautanen (2014). The aforementioned trends, technological and organizational changes in the work life are important to recognize in the university curriculum, but at the same time the universities should balance between the long-term trends and rising short-term demands for specific skills.

The role of university education for the development of competences was seen as important, but it was also questioned whether it is possible to learn all these at the university. Therefore, the respondents emphasised especially the development of thinking and learning during formal education. Furthermore it was emphasised that a lot of competences are actually acquired during work, stressing the importance of internships and summer jobs during the education. This also increases the employability of the students.

The information gained through the study is beneficial for the development of the organisations and of forest education curricula to decrease the mismatch between the work life and education that was perceived by the interviewees and also pointed out in the literature (Arevalo *et al*., 2010, García-Aracil and Velden, 2008. Thus increased co-operation between the universities and different forest sector actors on defining the competence needs and providing practical knowledge can help with responding the future competence needs of the bioeconomy.

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CRITICAL THINKING: A KEY ISSUE FOR HIGHER EDUCATION!

BARBARA HINTERSTOISSER

Abstract
Critical thinking is a prerequisite to meet the challenges of the 21th century. The upcoming and already existing problems ask for innovative ideas, new ways of thinking and acting. As a consequence university graduates, as potential leaders in industry and politics, have to have the ability to get off the beaten track. Profound knowledge, expertise in the field of study are delivered by the universities. A sometimes forgotten but very important task however is to promote critical thinking by our students and graduates to make them aware of how to deal with new challenges. This implies to even allow and motivate them to question what university teachers present. At the universities the state of the art is taught. The next step enters unknown area - for researchers as well as for graduates working outside the university - which has to be stepped in very carefully and thoughtfully. The ability of critical thinking is a basic requirement for these steps.

Keywords: critical thinking, university teaching, higher education, grand challenges

Background

It is a fact, that mankind is facing enormous challenges - the so-called "Grand Challenges of the 21st century" (EU, 2016). Among the questions that have to be dealt with are global change, limited resources, natural and man-made disasters, population dynamics and globalisation, social unbalance and poverty. Our graduates will be the ones who need to keep or regain their ability of critical thinking to be able to lead the dialogue between people and disciplines to initiate interdisciplinary approaches to overcome these challenges.

Global questions means facing global challenges. The number of people living on our planet in 2100 is estimated to be $11.2*10^9$. In 2005 the world population was $6.5*10^9$ and we expect $8.5*10^9$ by 2030 and $9.7*10^9$ in 2050 according to UN DESA (2015). How to feed the world? In addition, the growth is linked to an increasing longing for prosperity and a high standard of living. This is reflected for example in an increasing consumption of open space in the industrialized countries. In Austria, a dramatic change in land use can be observed. The growing use of land through covering, even sealing of the ground, and through building activities turns into a severe problem. Each day Austria loses about 22.4 ha fertile soil by construction of roads, houses, shopping centres or factory buildings. An extrapolation of this development leads to the conclusion that no fertile soil will be available in 200 years from now. Restoration of soil is a very complex and long lasting process. Only 10 cm of fertile soil are formed in about 2000 years (Anonymous, 2015)! Farmland as well as surrounding

forests are affected by an unbalance in our whole ecosystem. Growing prosperity goes hand in hand with an increase of energy consumption and increase of thermal utilisation of wood. A key issue of the 21th century is the use of renewable resources – but this is not a free ticket for unlimited growth as resources, even natural resources, are limited.

Role of the life science universities

Life science universities are expected to contribute to the conservation of resources for future generations. They have the task to educate the future generation to ecologically and economically sustainable use of the natural resources, and guide the students to become innovative problem solvers.

Our university graduates are the decision-makers and the policy-makers of today and tomorrow. And it is obvious that decision-makers and policy-makers should know what and why they are deciding, about whom and about what they are talking and especially about the consequences of their decisions. It is the duty of the universities to prepare students for these challenges and to provide them with the necessary competences.

Critical thinking

Universities should support students to become critically thinking graduates, an easily said phrase with a lot of content. Critical thinking includes the duty to never accept non-reflected arguments and conclusions. Critical thinking means to prove the hypotheses presented, the thoughtful distinction of quality and quantity, to verify and check proofs and evidences and finally – and very important – to stay open minded. Critical thinking is the only way to view a topic from different sides. The comprehensive search for information, no matter which position is favoured by oneself, is a prerequisite for critical thinking. It enables the creative generation of possible hypotheses and an accurate evaluation of information and evidences. The criteria in the critical thinking process are of course the identification of possible (counter-) evidences for different hypotheses and the assessment and prioritising of the possible hypotheses according to the available evidences and counter-evidences (Wessel, 2011). Critical thinking is far away from stubbornly following one idea, it is a demanding process. It needs the respect and appreciation of perceptions of others, even if one does not agree with them. It requires to know about the tentativeness of each position and view and the willingness to change or even adapt according to new information. New information has to be taken into account but checked through a catalogue of criteria. This requires a permanent feedback-check-reconsider-revise-process and is nothing else but an internal quality assurance process.

Higher education for critical thinking

Education is the basic prerequisite for critical thinking and the ability for critical thinking is a characteristic of education at universities – at least it should be! Curricula tightly packed with information and mere facts lead to non-critical absorption and non-reflected reproduction of not digested contents of lectures. Today's study programmes are quite often filled with lectures, exercises, excursions, seminars delivering knowledge, facts, data, expert information in the field of the different sciences. Discussing the setup of curricula voices are raised to include extra courses for soft skills, enabling our graduates to communicate, to present topics, to discuss problems. Important is to encourage our students to critically question what we are presenting to them. There has to be room for discussions among the students and between students and educators. The goal should be to prepare the floor for independent, autonomous formation of opinions and non-biased approaches to problems. Of course, universities should lead graduates to knowledge and understanding to become experts in their field. Contents are taught according to the state of the art and to current issues, based on research. There is never an end in research – it is an ongoing process. Life science universities teach on a high level of practical relevance using modern didactic methods. This should enable the students and graduates to question and correct their own actions and thoughts. Having achieved the capacity to accept criticism one will be open minded towards new and different opinions and ideas paving the road for innovation and problem solving capacity via the ability to obtain a multidimensional view on problems.

Higher education guides students to critical thinking by encouraging them to ask all kinds of questions (there is never ever a stupid question!) allowing and fostering discussions, teaching them to take nothing for granted. Students have to be aware that things might change – university teachers are just teaching the state of the art, which might change in the future. University teaching is driven by research – the next step from state of the art is unknown territory. University teachers have to prepare students for the unknown. Dialogue of students and teachers is a pedagogical method for teaching the young people to respect others – the basis for a good dialogue. Confronting students with complex problems and involving them in inter- and transdisciplinary projects together with students of other disciplines leads them to a better understanding of each other. As shown in Figure 1 a complex ecosystem like our forests has to fulfil many different tasks. To build bridges between the different interests and to be able to promote and guide the dialogue between stakeholders and people in general, the ability of critical thinking leads to a maximum of objectiveness and could help to avoid conflicts and to solve problems (Figure 1).

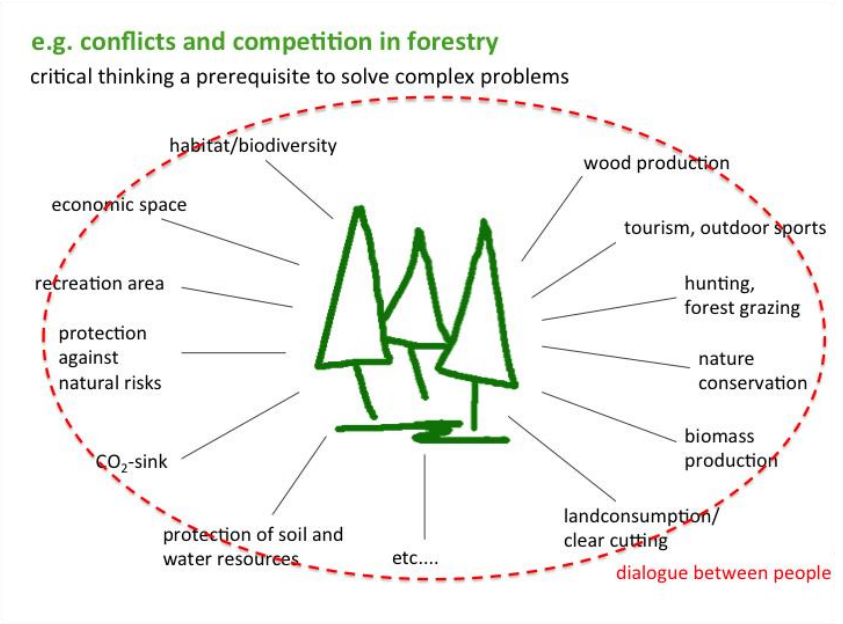

Figure 1: The manager of a forest needs to be aware of all the different tasks. People expect their needs to be fulfilled by this complex ecosystem. Source: Hinterstoisser, 2010.

From the educator's side it is necessary to encourage the interdisciplinary dialogue between the lecturers, to foster team teaching, problem and project based teaching, and to work in small groups. This would provide an ideal environment for critical thinking interaction, but quite often the real teaching and learning environment cannot fulfil these requirements because of legal or financial frame conditions.

Conclusion

To prepare young people to be able to solve the problems of the future through education is the responsibility of the society. The duty of universities is to provide the students with the necessary knowledge and skills in their fields of study, including the ability to listen and to talk to each other, to perform a critical discourse, to develop a mutual understanding, to work together in a team and to scrutinize critically what they have been taught. It is additionally of extreme importance to bring together students of different disciplines, countries and cultures and to foster the dialogue between students and also people from outside the university. Higher Education should be the driving force for critical thinking, interaction and dialogue between people, necessary to meet the challenges of the 21st century.

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THE FORESTRY CURRICULA AT THE UNIVERSITY OF NATURAL RESOURCES AND LIFE SCIENCES, VIENNA (BOKU): OBJECTIVES AND IMPLEMENTATION

HUBERT HASENAUER, SUSANNA-MARIA HENKEL

Abstract
The BOKU declaration for teaching and education contains the following objectives in developing teaching programmes: the teaching must be based on research results, focuses on the learning outcomes and learning processes, and finally the relevant infrastructure needs to be provided. The implementation principles are based on the three pillars (i) natural sciences, (ii) engineering and (iii) socio-economics. Each BOKU bachelor study programme must consist of at least 25% and each BOKU master programme of at least 15% of ECTS-credits covering each of the three pillars. This demonstrates the multidisciplinary teaching approach which is typical for all BOKU bachelor and master programmes including all forestry programmes.

Keywords: Forestry education, BOKU, Austria

Introduction and institutional framework at BOKU

The University of Natural Resources and Life Sciences Vienna (BOKU) was founded in 1872 with programmes in agriculture and forestry. In 1906, BOKU earned the right to award doctoral degrees (Dr. nat. techn.). 2003 was the beginning of implementation of the Bologna agreements (structure of Bachelor, Master and PhD), and since 2004, with a new legislation, the university is a state independent body. For some information about the forestry education at BOKU see Gossow, 1998; Gerzabek and Stampfer, 2013).

The aim of the curricula development process at BOKU is to evaluate and improve existing curricula, and restructure all curricula including the forestry programmes according to the Bologna requirements (workload, ECTS, labour market). This also indicates a shift from a „focus on teachers“ to a „focus on students“, by defining „learning outcomes“ (skills, knowledge, competencies) for each lecture and curriculum. After a three years consultation process, involving professors, students as well as external experts, the quality principles for BOKU teaching programmes were redefined and implemented by the university senate, the governing body for all BOKU teaching programmes.

Figure 1 provides an overview of the organisational structure of BOKU. On the top, there are the governing bodies: University Board, Rectorate and Senate. The scientific disciplines are structured into 14 departments including forestry. Within the

departments there are institutes or chair groups. Research and teaching is being supported by the service facilities.

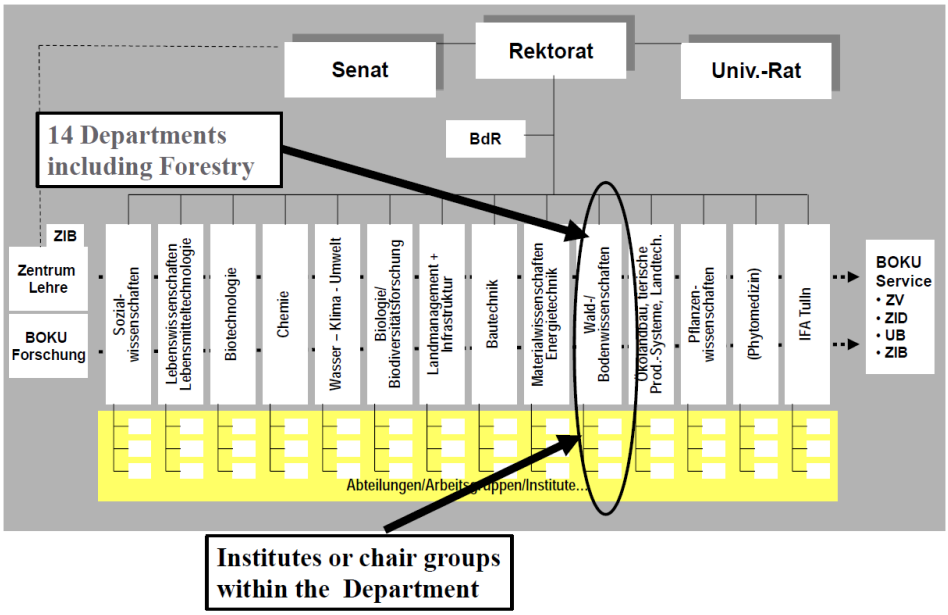

Figure 1: Organizational structure of BOKU

Teaching programmes at BOKU

Within the university structure (see Figure 1) the following Bachelor and Master Programmes are taught:

- 8 Bachelor Programmes, one in cooperation with the University of Veterinary Medicine (UVM), Vienna;
- 15 Master Programmes in German, one in Cooperation with UVM, Vienna;
- 4 Master Programmes in English;
- 11 international Master Programmes (German and English);
- 4 Doctoral programmes:
  - Natural Sciences;
  - Social Sciences;
  - PhD Biomolecular Technology of Proteins (BioToP);
  - International Graduate School in Nanobiotechnology (IGS-NanoBio).

The relevant forestry programmes at BOKU are:

- Bachelor (6 semesters, 180 ECTS-credits):
  - Forestry (in German);
  - Wood technology (in German);
- Master (4 Semesters, 120 ECTS-credits):
  - Forestry (in German);
  - Mountain forestry (in English);

- European forestry (international programme jointly offered by BOKU, University of Eastern Finland, University of Freiburg, Swedish University of Agricultural Sciences, University of Lleida, Wageningen University and AgroParisTech, in English);
- Mountain risk / torrent and avalanche control (in German);
- Wood technology and management (in German);
- Material and energetic exploitation of renewable raw materials "NAWARO" (also an international programme in cooperation with Technical University of Munich, in German);
- Wildlife management (in German);
- Lifelong learning programme: Hunting management (in German).

The organization of curricula development at BOKU

There are different levels of responsibility for the internal and external control of curricula (Figure 2). On top, there is state legislation by law. On the second level the university can regulate by statute. In this framework, the senate can implement guidelines for the structure of the curricula. Model curricula for Bachelor- and for Master programmes include most of the internal guidelines like the three-pillar principle. After the implementation, quality control ensures the continuous development of curricula. Trigger for development steps can be legislative changes like the initial study phase in Bachelor programmes, new standards at BOKU or improvements of the implementation of Bologna milestones like the review of studiability, the distribution of ECTS-credits or the formulation of the learning outcomes.

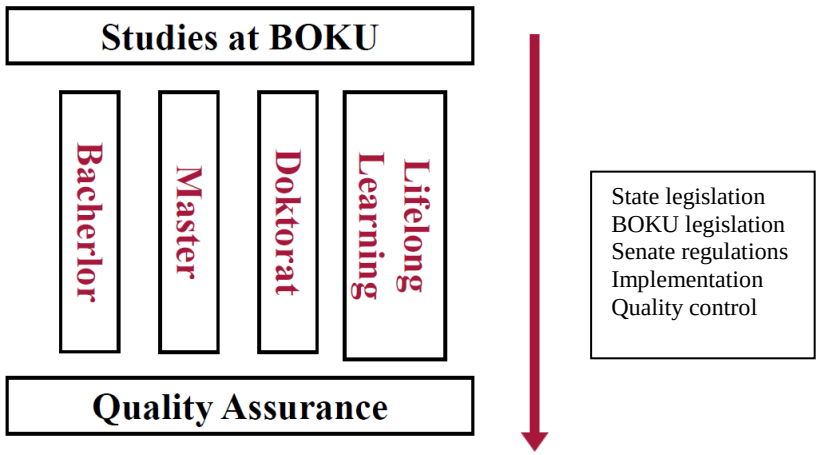

Figure 2: Levels of internal and external control of curricula.

Crireria of the strategic approach in the design of study programmes are the areas of competences of BOKU, the requests from society, the scientific development and the employment requirements for the graduates. Like other universities, BOKU is also facing some large challenges of university education. Different goals must be

harmonised in the design of study programmes like theory and practice orientation with the claim of employability, research goals and education goals. Another challenge is to consider tradition and innovation – especially within the forestry curricula, nationality and internationality, disciplinary and interdisciplinary aspects.

After the implementation of the Bologna structure, BOKU launched a large participatory process to check the new structure. This process contained the strategic development of new curricula and the evaluation and improvement of existing curricula. The consultation process involved teachers, students, management and external experts. Important steps are the check of workload and the ECTS-credits, as well as the labour market situation for the graduates. Further issues are the analyses of internal and external factors of education environment, the basic design and structure of curricula (model curricula), guidelines for curriculum development (flowchart for developing a study programme) and improvements of the content of curricula (workload, structure etc.).

An ongoing challenge is to implement the paradigm-change from „focus on teachers“ to „focus on students“ and to define „Learning Outcomes“ (skills, knowledge, competencies) on the level of single lectures, modules and curricula.

BOKU declaration for teaching and education

The teaching at BOKU is research-driven and focuses on the learners and learning processes (competence orientation according to the Bologna declaration), furthermore there is the orientation by study goals, competencies and learning outcomes established.

Education is focusing on sustainable development, problem solving and developing competences. Not at least, BOKU is providing adequate infrastructure for the realization of top-quality and efficiency of teaching as well as continuing didactic training of teachers and participation of students. BOKU promotes education for sustainable development (ESD, see UNESCO, 2016) as a key qualification. To achieve these aims and maintain these levels, a continuous change of teaching and learning processes is necessary: ECTS-credits must correspond to the quantitative workload, internationalization is continuously to be developed and questions of lifelong learning have to be dealt with.

Bachelor programmes start with basic courses, with the study orientation and entrance phase. Preparatory training for profession and theory has the objective of preparing for the Master studies. Master programmes track the aim of deeper understanding and professional skills. Both, Bachelor and Master, are science based.

A flowchart for developing a study programme
To manage curricula development in a well-structured and understandable way, a flow chart has been developed, which makes the internal procedure binding. (An external accreditation is not required for study programmes of state universities.) This process has the following stages:

- Step 1: Transmission of a pre-concept to the senate presidency by the operator of the idea.
- Step 2: Strategic statement on the pre-concept by the rector of the university.
- Step 3: Decision by the senate to continue / or not continue the process by the senate. The operators of the idea are informed of the decision. The process stops at this point if the decision is negative.
- Step 4: Nomination and establishment of a working group for the development of the curriculum and notification of the members.
- Step 5: Development of the curriculum by the working group and submission to the respective academic commission and the curricular commission of the senate.
- Step 6: Transmission of the application to the center of teaching and learning for the check of the laws regulating university studies, and check of the affordability by the rector. The process stops at this point if it is not financeable.
- Step 7: Discussion about the quality of content and structure and decision about the curriculum by the respective academic commission, the curricular commission of the senate and by the senate.
- Step 8: Announcement in the official bulletin of the university.

Further steps of the implementation of a study programme are: planning of teaching, of timetable and of teaching rooms. The process of changing a curriculum is shorter. It starts with an application of a teacher to the respective academic commission and continues with step 6.

Quality principles of teaching

BOKU promotes education for sustainable development and competence as key qualifications. BOKU stands for research-driven teaching and teaching that focuses on the learners and learning processes (competence-orientation according to the Bologna declaration). The infrastructure for the realization of top-quality and efficiency of teaching is also important, supported by regular didactic training. In a participatory process, principles and values for good teaching and learning were developed and enshrined by students, teachers and the management.

Joint degree programmes: At BOKU, degree programmes offered in cooperation with other Austrian or international post secondary educational institutions are preferably held as joint degree programmes. Double or multiple degree programmes are offered only in exceptional cases.

Strategic concept bachelor – master: The Bachelor programmes are intended to provide basic knowledge, they are theory oriented and prepare for Master

programmes. They include an entrance phase which is required by law. They are oriented to the BOKU Master programmes. Both, Bachelor and Master are science based. They are flexible for mobility and offer a professional perspective. Students have the possibility to switch from one Bachelor to different Master programmes.

The template of curricula for Bachelor and Master: The template shows the structure of Bachelor.- and Master curricula at BOKU with regard to form and content. It applies to all programmes and is intended to assist with the preparation of curricula. It contains the qualification profile, admission requirements, information about the programme structure (compulsory courses, elective courses, free electives), information about compulsory internship, about Bachelor and Master thesis, completion, academic title, examination regulations, transitional provisions, and the types of courses. Details are given below:

- The *qualification profile* is the part of the curriculum that describes which academic and professional qualifications the students should acquire in the course of the degree programme. It consists of two parts:
  - The section "knowledge and personal and professional skills" includes knowledge and skills, both personal and professional, that graduates of this programme should have mastered, listed in detailed form as learning outcomes.
  - Under the heading "professional qualifications" you can find the possible fields and professions the graduates of the programme are qualified to work in. It is important to ensure that the qualification profile above conforms to the fields and professions listed here, as certain professions require the mastery of specific knowledge and skills.
- For *admission requirements* it must be ensured that completion of a BOKU Bachelor programme entitles graduates to admission in at least one Master programme in a relevant field with no further requirements. The academic programme committee determines which Bachelor programme qualifies students for admission to which (consecutive) Master programme or programmes in a relevant field or fields. The academic programme committee also decides which knowledge and skills must be mastered at the Bachelor level as a prerequisite for admission to a Master programme. Required learning outcomes should be formulated as clearly and specifically as possible. The individual student is responsible for providing proof of mastery of the required skills and knowledge.
- The *programme structure* contains the duration, total number of ECTS credits and the three-pillar principle, which is the central identifying characteristic of both the Bachelor- and the Master programmes offered at BOKU. In the Bachelor programme, the sum of the compulsory and elective courses must be made up of at least 25% technology and engineering, 25% natural sciences, 25% economic and social sciences, law. In the Master programmes, the sum of the compulsory and elective courses must be made up of at least 15% technology and engineering, 15% natural sciences, 15% economic and social sciences, law. The Bachelor and Master thesis, compulsory internship and free electives are excluded from the three-pillar rule.

The *bachelor programme* consists of courses and other requirements worth a total of 180 ECTS credits. This is equivalent to a duration of six semesters. The programme is divided into:

Compulsory courses:	a minimum of 150 ECTS-credits, including
Compulsory internship:	3 ECTS credits (*if required*).
Bachelor thesis:	12 ECTS credits.
Elective courses:	maximum of 20 ECTS credits (actual number of ECTS-credits)
Free electives:	maximum of 18 ECTS credits.
Foreign language classes:	At least 10 ECTS credits (*compulsory courses, elective courses, free electives).*

The *master programme* consists of courses and other requirements worth a total of 120 ECTS credits. This is equivalent to a duration of four semesters. The programme is divided into:

Compulsory courses:	no fewer than 20 ECTS credits, including Master´s thesis seminar, minimum 2 ECTS (*if required*)
Compulsory internship:	3 ECTS credits (*if required*)
Master's thesis:	30 ECTS credits (*not including the Master's thesis seminar)*
Elective courses:	no more than 52 ECTS credits
Free electives:	18 ECTS credits
Foreign language classes:	At least 10 ECTS credits (*compulsory courses, elective courses, free electives*).

The workload required to complete a specific learning outcome in a teaching unit (course, module, etc.) is expressed in *ECTS credits*. One ECTS credit corresponds to 25 60-minute hours, and one academic year is worth 60 ECTS credits.

The *following types* of courses are available: lecture, exercise course, practical course, compulsory internship seminar, seminar, field trips, master thesis seminar, mixed-type courses: lecture and seminar, lecture and exercise, lecture and field trip, project course, seminar and field trip, exercise and seminar, exercise and field trip.

If the programme contains modules, then a *description of each module* must be prepared according to a structure and added to the curriculum.

Ideally, a study programme should require *foreign language-taught courses* worth a total of 10 ECTS credits at least. The Academic Programme Committee (Fachstudienkommission) determines the actual number of required ECTS-credits, based on the guiding principle that a study programme, especially a Master programme, should include as many courses taught in a foreign language as possible. Foreign language-taught courses are not restricted to any specific language.

In a master programme *modularization* is generally preferable. The smallest modular unit should ideally consist of 6 ECTS credits. A module must be made up of at least two types of course; in the case of mixed-type courses, one type is sufficient.

Free electives worth a total of maximum 18 ECTS credits are required to complete a bachelor programme, 18 ECTS credits to complete a Master programme. Free electives may be selected from all courses offered by all recognized universities in Austria and abroad. Free electives are intended to impart knowledge and skills in the student's own academic subject as well as in fields of general interest.

In the Bachelor programmes an *internship* in a relevant discipline area according to the study programme must be completed. In some of the Master programmes an internship is recommended. The internship should take place in private forest enterprises, state forest service or at academic institutions. Students should be given the opportunity to complete this internship abroad and be strongly encouraged to take advantage of this opportunity. Three ECTS credits are to be awarded for an internship, regardless of duration in working weeks. The ECTS credits are awarded for completion of an internship seminar, and not for the work actually performed. Completion of the internship is the prerequisite for participation in the internship seminar. Students are required to document this by presenting confirmation of the completed internship.

An internship is intended to help students improve the skills learned in their degree programme. It is also intended to encourage students to learn to apply what they have learned into practice, and recognize relationships between theory and practice. The academic programme committee responsible for the programme in question determines the length of the compulsory internship. It is recommended to complete the internship between the second and third semesters of the degree programme. Students may also split the internship into more than one part. The internship seminar provides students with a thematic review of the internship experience. Completion of the internship seminar is the confirmation of the completion of the compulsory internship or the substitute activity.

As part of a Bachelor programme a *Bachelor thesis* of 12 ETCS credits must be written. The aim of the thesis is to accomplish or to edit a defined scientific problem. It may consist of a practical and a written part. A bachelor thesis can be written either by one student or by a group of students. The thesis takes place within the course Bachelor seminar.

As part of a Master programme a *Master thesis* of 30 ECTS credits must be written. It is a paper on a scientific topic. With their Master thesis, students demonstrate their ability to independently address a scientific topic, both thematically and methodically. The topic of a Master thesis shall be chosen in such a way that it is reasonable to expect a student to be able to complete it within six months. Two or

more students may jointly address a topic, provided that the performance of individual students can be assessed. The Master thesis shall be written in German or English. Languages other than German or English are allowed only if approved and confirmed by the thesis supervisor. The thesis defence must be held in German or English regardless of the language of the thesis. The Master has been completed when the student has passed all required courses and received a positive grade on the Master's thesis and defence examination.

Graduates of the Master programmes are awarded the academic title Diplomingenieur (m) or Diplomingenieurin (f), abbreviated as Dipl.-Ing./ Dipl.Ing^{in}. or DI/DI^{in}. Alternatively, graduates are awarded the academic title Master of Science, abbreviated as MSc or M.Sc. (alternative for international or internationally-oriented programmes). The academic title Dipl.-Ing./Dipl.Ing^{in}. or DI/DI^{in}, if used, shall precede the bearer's name, while the academic title MSc shall follow it.

Forestry in Austria

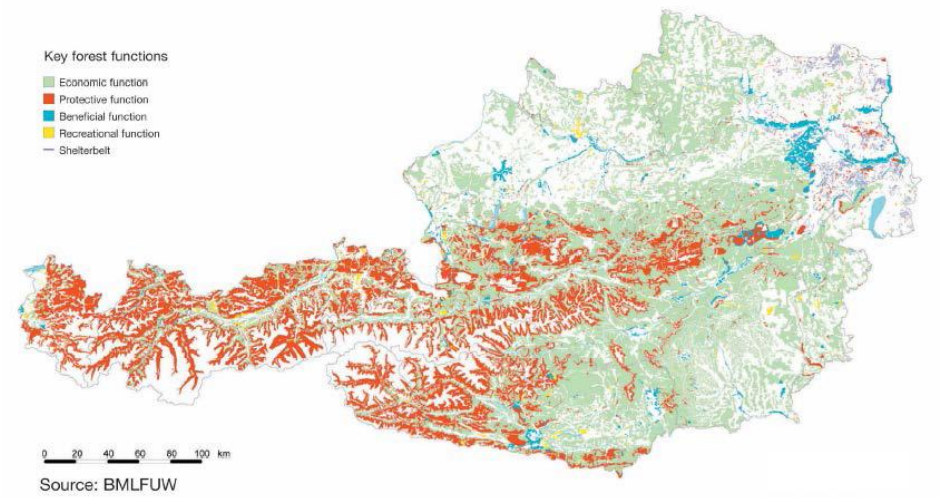

Figure 3: Austrian forest cover. Main forest functions: Green: Economic function, Red: protective function, Blue: beneficial (welfare) function, Yellow: recreational function.

The total forest area in Austria is 3.96 Mill. hectare or 47.3 percent, forest area increases by 7000 ha/year. 15 percent of forests in Austria are owned by the state of Austria, 32 percent by private companies owing more than 200 hectare and 53 percent by small land owners and farmers. Austria has five national parks. The largest and longest existing (since 1981) is the national park "Hohe Tauern" with 185,600 hectare. The majority of the national park areas are in private ownership. The main forest functions in Austria are the economic function, the protective function, the beneficial (welfare) function and the recreational function (see Figure 3).

Summary and conclusion

The Bachelor and Master studies at BOKU qualify at a high level for the diverse topics associated with forestry. The forest is seen not only in its economic utilization, but especially in an ecological context. The studies cover general holistic foundations and specialties. BOKU studies relate to innovative forms of wood utilization as well as to natural spatial issues, the protective function of the forest or the forest as a recreational area. The interdisciplinary and holistic approach at BOKU is well suited to treat environment issues. In order to remain on the top, the ongoing quality assurance of studies is essential. Graduates are well-prepared to work in a variety of jobs, from higher forest-service, research and development in the field of renewable resources to special areas such as the protection against natural hazards. Moreover, the jointly offered master programmes qualify for international forest resource management.

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HIGHER FORESTRY EDUCATION IN THE BURYAT STATE ACADEMY OF AGRICULTURE, BURYATIA, RUSSIAN FEDERATION

ALEXANDER ALTAEV, ZOYA YAMPILOVA, ERZHENA IMESKENOVA

Abstract
Traditionally, higher education programmes in Russia were developed to meet the societal needs. The latest reforms in the economic system of the country were followed by a modernization of higher education. The paper informs about the changes in the national educational standards in forestry sciences and about the cooperation with European universities related to Bologna Declaration principles implemented in Russian universities. This study examines federal educational standards in forestry with as example the Master programme developed and delivered at the Buryat State Academy of Agriculture. Based on the training needs in forestry, a EU co-funded TEMPUS project "Support to vocational training in sustainable forestry: a lifelong learning approach" has been developed and approved for funding in 2014. It is implemented by a consortium coordinated by the forestry department of Lleida University in Spain. The modular curriculum in Sustainable Forestry will be developed with five partner universities in Russia and Moldova.

Keywords: Bologna Declaration, modernization of study programmes, Federal educational standards, MSc programme forestry

Introduction

Higher forestry education in the Republic of Buryatia is provided by the Buryat State Academy of Agriculture (BSAA) which is named after V. R. Philippov. It was founded in 1931 in Ulan-Ude and is the first institution of higher learning in the Republic of Buryatia. This republic is located in the south of the East Siberia, southwards and eastwards of the Lake Baikal (see Figure 1).

The territory of the Republic covers 351,300 km2 and with a population over 960,000 people it equals the territories of 10-12 regions of the Central European part of the Russian Federation. The economy of the republic used to rely on natural resources, forest included, but with the strict regulations on Lake Baikal as a World Natural Heritage Site the societal needs and requirements for environmentally related knowledge and skills have changed.

At present, the academy, located in Ulan-Ude, consists of six faculties and three institutes; with 8000 students enrolled, taking day-time and distance education. They can choose from 23 BSc, 7 MSc and 25 specialist-diploma programmes. The research

and education covers a wide range of agriculture and forestry related sciences. Higher forestry educational programmes at the BSAA are relatively young. First students were enrolled

Figure 1: The Republic of Buryatia in the Russian Federation. In blue the capital Ulan-Ude.

in 2005 at the Faculty of Agronomy and in 2009 the BSAA introduced BSc and MSc programmes. The introduction of forestry programmes at the BSAA was a response to
the needs of specialists in the sector and to the implementation of the Forest Code of the Russian Federation (see Forest Code, 2006) of 2006, which radically changed the system of state forest management, changed the functions and powers of industry organizations, as well as the range of duties of managers and professionals working there. Professional standards being developed accordingly resulted in higher requirements for the level of competences and qualifications of personnel. Forest sector institutions that were used to employ specialists with another education than specialized forestry education - for example environmental, or agricultural (graduates of the Agronomy Faculty), educational, medical, veterinary or other universities - will (have to) give preference to graduates in the field of forestry, forest management, surveying, mapping, forest protection, forest entomology, plant pathology, etc.

This period of new developments in the forest industry coincided with the period of modernization in Russian higher education and engineering education in particular. Having joined the Bologna Declaration, the Russian Higher Education Institutes (HEIs) have to review and renew their programmes in accordance with the international quality assurance standards. In 2007 Russia enacted a law on the two-tier system of higher education (Artamonova *et al*., 2015). In the context of the Bologna agreement with its Anglo-Saxon education traditions there are both

advantages and disadvantages which are very significant for Russia. But now it is important not to talk about them, but to benefit from the first and to avoid the second.

Developments since 2010

Since January 1, 2010 the third generation of the Federal Education Standards (FES[1]) has been introduced. FES is a generalized, legally approved social norm of federal (national) level. It provides a "framework" but a rather "rigid" nature in relation to old standards that were content oriented. For the respective field of science it is designed to ensure:

- the unity of the all-Russian Higher Education;
- the socially needed quality of higher education throughout the territory of the Russian Federation;
- a basis for an objective evaluation of educational institutions implementing educational programmes of higher education;
- a basis for the recognition of international documents of higher professional education;

The main principles of FES that make it different from the previous standards are:

- the focus on learning outcomes as common cultural and professional competencies implying the ability to apply knowledge, skills and personal qualities in order to be successful in a particular area;
- the use of the tools as described in the Bologna Declaration (ECTS credits as units to measure workload of the curricula and tier training);
- the focus on social needs and the innovative nature of education and educational technologies;
- more academic freedom for students and teachers, including a section with courses to be selected from a list by students . This section of the programme is defined as a variable part of curriculum, to be determined by the university;
- higher requirements for staff, training facilities and equipment, library and IT;
- significant university autonomy in the curriculum development (50% - for undergraduate programmes, 70% - for Master programmes).

Thus, FES provides Russian HEIs with new opportunities for programme development corresponding to the requirements of both national and European standards. The main features of the third generation of standards are the use of the outcomes-based approach, the use of the ECTS credits to evaluate the workload of programme modules and a broader involvement of relevant stakeholders in programme development. Thus, the FES for master curriculum includes the following sections:

- Range of application;
- Acronyms;
- Description of the speciality;

[1] In 2015 a new FES was issued, but it will not be discussed here.

- Description of expected graduate's professional activity (both for first and second degree programmes);
- Requirements for programme learning outcomes (graduate's competencies)
- Requirements for programme structure;
- Requirements for programme implementation.

The first three sections include descriptive information about a particular programme. The HEIs are granted the right to define the profile of their Master programmes within a specified discipline or speciality, respectively. Sections 4 and 5 of the Standards describe the professional activity and the requirements for graduates' competencies following the tradition of the Russian higher education. Section 4 includes fields, objects, types and tasks of professional activity that graduates of master programmes must be able to achieve or solve. These descriptions serve as a basis for formulation of requirements for programme learning outcomes that are given in section 5. The requirements for programme learning outcomes are presented as competencies (in the FES, a competence is an integrated term used for knowledge, skills, attitude and experience). They further are presented in the layout of MSc programme as codes. For example: general cultural competences – as GCC, professional competences – PC). The section 6 contains requirements for a curriculum (the workload of the study cycles and modules, expected learning outcomes). Section 7 is discussed below.

The current programmes

Compared with the federal standards of the second generation, the new curricula in forestry have the following structure:

- The duration of BSc curriculum is three years. It consists of three focus areas: (1) Humanitarian, social and economic , (2) Mathematics and science, (3) Professional with three sections (physical training; industrial practice; final state certification);
- The duration of MSc curriculum is 2 years and it consists of two focus areas (general scientific and professional) and three parts (industrial practice; research work; final state attestation);
- Each training cycle has a basic (mandatory) part and a variable part (the profile with courses determined by the university, and a modular construction);
- A curriculum layout is presented with the example of MSc Forestry curricula at the BSAA (see Table 1).

The workload of the cycles and sections may vary depending on the profile.

The section 7 contains the requirements for programme implementation: list of the obligatory programme documentation; requirement for use of different educational technologies / methods / study forms; requirements for programme curriculum (availability of electives, laboratories, internships and research works; maximum workload per week, maximum contact hours per week, duration of vacation within

the academic year); faculty requirements; requirements for information resources and library infrastructure; general requirements for programme financing.

Table 1: The curriculum structure of MSc Forestry, profile Forestry, Silviculture and Forest Fire Science.

Cycles	Trainings cycles, modules, learning outcomes	ECTS Credits	List of disciplines, textbooks, manuals
M.1	General Scientific Cycle	20	Mathematical modelling of forest ecosystems
	A student must: Know: methods of planning and conducting research, data collection and interpretation; research results presentation; problems and trends of scientific developments. Be able to plan and carry out research, organize and interpret data; present research results Apply: methods of mathematical modelling, methods of research presentation…	6	Philosophical problems of science and technology
	Variable part (knowledge and skills are to be defined by the university)	14	IT; Business English; Current issues of forestry, silviculture and forest fire science; History of forestry, The methodology of scientific knowledge; Forestry infrastructure; Landscape taxation.
	Professional cycle. Basic (general professional) Learning outcomes: A student must: Know: know the laws of development of plant communities; biodiversity preservation, the principles of their economic use; principles of development and intensive technologies of growing plant and forest plantations; legal framework of sustainable forestry; Be able to design and control reasonable use of ecosystem; technology of growing woody plants Apply: laws and norms of sustainable forestry, technology of growing woody plants, methods of forest fires control; forest resources reproduction methods	15	Management of biological and technological systems in the forest sector; Economics and organization in forestry complex; legal and social aspects of sustainable forestry
	Variable part (knowledge and skills are to be defined by the university)	25	Problems of sustainable forestry; Assessment of the state forest fund; Monitoring of forest fires; Natural foundations of silvicultural systems; Remote sensing of forests; Silvicultural processes and change of forest species; Diagnosis of trees and shrubs; Gardening and horticulture; Recreational forestry; Optimizing reproduction of forest resources; Methods for environmental studies in forestry.
M.3	Practical placement and research work. Practical skills are to be defined by a HEI	50	
M.4	Final state attestation	10	
	Total work load	**120**	

It hasn't been an easy process for Russian universities to introduce changes. Here it is worthwhile mentioning the experience of European universities in implementing Bologna principles which they shared with us through TEMPUS programmes. Projects on curriculum development, university management and structural measures have been jointly designed and implemented since 1999 to help Russian universities in modernization of higher education. While we have been busy implementing main principles of Bologna Declaration, European Universities were engaged in looking for ways to provide education and learning to a diversified student population. They are adapting study programmes to ensure that they are designed to widen participation and attract returning adult learners. They recognize that integrating lifelong learning to the mission of universities is essential to enhance the creativity and innovation profiles of institutions.

Cooperation in Tempus

Taking advantage of the successful cooperation experience in TEMPUS, the consortium of University of Lleida, University of Natural Resources and Applied Life Sciences (BOKU, Vienna) and University of Eastern Finland (all from European Union) on the one hand and on the other hand Buryat State Academy of Agriculture, Moscow State Forestry University, St. Petersburg State Forest Technical University (all three from Russia), and "Alecu Russo" State University of Balti and State Agricultural University (both from Moldova) have jointly designed and are implementing TEMPUS project "Support to Vocational Training in Sustainable Forestry: a Lifelong Learning Approach" (see TEMPUS, 2014; http://www.mgul.ac.ru/tempus).

The overall aim to which the project will contribute is to strengthen the capacity of higher education institutions in Russia and Moldova for international cooperation and opening themselves to the non-academic community. To achieve this goal, the following specific objectives were set:

- to create a system of life-long-learning (LLL) in the sector of sustainable forestry at universities in Russia and Moldova;
- to improve teaching capacity at Russian and Moldovan universities in LLL delivery;
- to develop a LLL based modular curriculum on sustainable forestry and to deliver pilot training;
- to ensure efficient project management, dissemination and sustainability.

Conclusions

The project should make higher education more inclusive and responsive offering a wider range of educational services to new learners, encouraging employment and capacity building. An increasingly and diverse demand is presumed from a broad spectrum of students – including postsecondary students, adult learners, professionals who seek to up-grade skills for the workplace, senior citizens taking advantage of

their increasing longevity to pursue cultural interests, and others – for high quality and relevant higher education throughout their lifetime.

Two years of the project implementation have proved that education and training should react immediately to the emerging educational needs.

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GREEN MODULE IN FORESTRY CURRICULA IN ACADEMIC FORESTRY EDUCATION

NATALIA KHUTOROVA

Abstract
Green economy creates green jobs, which are decent jobs because they improve all sectors of economy. And the forest sector, including its skilled workforce which is able to implement sustainable forest management, contributes to achieving the social goals of the green economy. Moscow State Forest University (MSFU) holds that university curricula should be modified, so that they include issues linked to the social aspects of forests and forest management, environmental management, and social responsibility. All such 'green' courses can contribute to the transition towards a green economy.

MSFU believes here that it is very important to create a special green module in forestry curricula in academic forestry education. There will be no uniformity, but different profiles of curricula in various universities. Without doubt, universities need and will closely cooperate, even share best practices and promote policies, which are effective, efficient and equitable. How MSFU implement these ideas in its Master programmes is described in this paper.

Key words: Green economy, green module, Master programme, forestry education, social aspects, environment management,

Introduction

Human well-being depends among others on the health of ecosystems which need restoration through the development and implementation of new policies. One of the possibilities here is to provide sustainable development based on the "green economy" principles. The environmental requirements, nowadays known as the green economy principles, determine the direction of innovative development and modernization in order to ensure a steady economic growth. The green economy priorities and the environmental requirements should be included into the national general development plans addressing socio-economic issues (Anonymous, 2012a).

A green economy can contribute to societal progress and human well-being in two ways (Anonymous, 2012b): Firstly, redirecting investments towards green goods and services can help meet the basic needs of the poor such as access to clean energy, safe water and adequate sanitation. Secondly, it can be done through redirecting investments towards the strengthening of human and social capital.

The forest sector is important in terms of its environmental, economic and employment impact. The sector can make a significant contribution towards meeting

green economy objectives, linked to climate change policies, reducing greenhouse gas emissions and expansion of renewable energy objectives.

Overall, forests store a quarter of all carbon on the earth (more than all the carbon in the atmosphere), significantly mitigating greenhouse gas (GHG) emissions. Tropical forests absorb 14% of the world's carbon dioxide emissions every year. Approximately 1.7 billion tonnes of carbon are released annually due to land-use change, mainly from tropical deforestation. This represents about 17% of the annual global CO2 emissions, greater than the amount emitted by the global transport sector (UNEP, 2011b).

Forests are important for employment and livelihoods. Summing up, we can see a wide range from 119 to 1,420 million forest-dependent people all over the world (see Table 1). So the number of forest-dependent employment and livelihoods is rather large and almost 20% of the world population; this fact stimulates the governments of different countries to pay much more attention to forest education and retraining in this area. Nowadays Moscow State Forest University (MSFU) is involved in developing a new policy and paradigm towards green economy and implementing them in her curricula.

Table 1: Forest-dependent employment and livelihoods in million people ([UNEP, 2011a).

Category	**Number**
Formal employment in forestry, wood processing and pulp and paper	14
Formal employment in furniture industry	4
Employment in informal small forest enterprises	30-140
Indigenous people dependent on forests	60
People dependent on agroforestry	500-1,200
Total forest-dependent employment and livelihoods.	119-1,420

United Nation Environment Program (UNEP) has defined 10 sectors for a greener planet. The forest sector is one of them. 'Greening' the in principle green forest sector implies managing it and investing in it as an asset class producing a wide range of benefits to society. The wider economic role of forests in a green economy includes factories of production as well as ecological infrastructure (producing public goods and services from climatic regulation to water-resource protection) and providers of innovation and insurance services (forest biodiversity being key to both). The greening of the forest sector will be driven by societal demands for ecosystem services spread across several sectors (UNEP, 2011a).

The civil society should play an important role in the process of greening of the forest sector including sustainable development. Public organizations, youth movements, and professional institutions and of course forestry education are addressed here. Successful implementation of these ideas involves the formation of a broad movement in support of sustainable development as a priority activity of the civil society. A key role in addressing the problems of sustainable development by society, and in raising broad public interest is played by culture and cultural and natural heritage (UNEP, 2011a).

Education is an important tool for sustainable development.

In general, education is one of the pillars of sustainable development. The societies of tomorrow will be shaped by the skills and knowledge acquired today. By their very nature, education, sciences, culture, information and communication have the power to generate the necessary transformational changes towards sustainable development and green societies.

Green economy creates green jobs, which are decent jobs because they improve energy and efficiency of raw materials. The skilled workforce is able to implement sustainable forest management, and the forest sector contributes to achieving the social goals of the green economy.

Education has been highlighted as an important tool for the attainment of sustainable development in December 2002. The United Nations General Assembly adopted the resolution 57/254 that designated the period from 2005 to 2014 as United Nations Decade of Education for Sustainable Development (UNESCO 2005, 2007). During this period, governments were expected to promote education across all sectors on sustainable development using both formal and non-formal approaches. In addition, the UN also mandated UNESCO to spearhead the implementation of ideas mentioned in the Decade by providing support to governments to develop an International Implementation Scheme. Educating to deal with complex issues that threaten planetary sustainability is the challenge of Education for Sustainable Development (ESD). It will take a broad and deep effort from many sectors of society (UNESCO 2005, 2007). The key role of education and training for transition towards green economy should be stressed and education is held to be central to sustainability. Indeed, education and sustainability are inextricably linked.

Now education programmes in many Russian forestry universities are going to focus on professional profiles closely linked to those of civil servants. We need to adapt education programmes so to take into consideration subjects and skills required by other professional profiles linked to forestry to stimulate the transition to green economy.

Social issues are still missing in most of the Russian forest universities education programmes. Current university curricula should be modified, so that they include questions linked to the social aspects of forests and forest management, environmental management, social responsibility. All of such courses can contribute to the transition towards a green economy.

In this respect, it is very important to create a special green teaching module in forestry curricula in academic forestry education. There will be no uniformity, but different course profiles for curricula in different places. Without any doubt, the universities will closely cooperate, even share resources in joint activities like teaching, but they will also compete more than before. The forest educational

community should share best practices and promote policies, which are effective, efficient and equitable.

Green teaching module in forestry curricula in academic forestry education in Moscow State Forest University

The new Russian educational paradigm aims to increase the competitive advantage of our universities and Russian economy on the whole. Several years ago there were about 60 forest universities all over Russia, but now many of them have been merged into large regional polytechnic universities. Therefore, the map of forest education has changed a lot lately, but the forest educational community collaborates when setting up new BSc and MSc programmes.

This paper from Moscow State Forest University (MSFU) shares information about our university initiatives towards to greening forest sector. MSFU was founded in 1919 and now has a leading position in forestry education and research for the Russian forest sector for more than 70 years. Nowadays, MSFU is modernizing, splitting traditional faculties and departments to create a new educational model with a cross disciplinary approach. We are at the very beginning of creation of green teaching module in our forestry curricula. The aim is two-fold: to be competitive in the educational area and to prepare new specialists for various forest linked enterprises who are involved in green economy. Following are our first steps in this rather difficult way.

Our university established a new study programme: Master of Science in Forestry, which is a two-year programme providing academic education in forest science. The programme offers a new approach to the markets in forestry and nature management and it connects the increasing number of forest-related issues. The objectives of the MSc programme are to educate professionals who have a core understanding both in sustainable forestry and in modern Russian and international business culture. The MSc in Forestry is intended for students who wish to work with forest-related topics and in different fields of environmental sciences. We started in 2015 and first masters will graduate in 2017. According to the new regulations of the Ministry of Education, all students who have a BSc in any discipline and who pass the entrance examinations, can enrol in this MSc. Most of the teachers are unhappy with this situation.

The MSc programme is specifically designed to take into consideration the needs of potential employers and we hope our graduates will be highly appreciated by research institutions and forest linked enterprises.

In the field of this programme our university is going to collaborate with Russian and foreign universities to offer joint study modules in addition to our existing courses. This collaboration can be based on TEMPUS experience and various joint educational programmes, implemented in MSFU and other Russian institutions.

The Master programme combines various aspects of management with forestry topics. Our programme includes a Green Module, providing the participants with general leadership know-how and knowledge in finance, social issues, and human resources. The curriculum structure is traditional and consists of 8 modules (see Table 2).

In Table 2, the traditional curriculum Master of Science in Forestry, is listed. The Green Module is included, it is specified in the list of special courses, which are closely linked to 'green'.

Table 2. The curriculum Master of Science in Forestry.

N	Name of module	ECTS credits
1.	Module1 – Modern Trends in Forestry (International and Russian)	6
2.	Module 2 – Sustainable Forest Management	3
3.	Module 3 – Elective courses	34
4.	Module 4 – Field Course Research & Development	20
5.	Module 5 – Multifunctional Forestry	9
6.	Module 6 - Social Issues Linked to Forestry	9
7.	Module 7 – Advanced courses	9
8.	Module 8 – Master's thesis	30
	Total	120

The innovation for us is to spin off into a separate green module several multidisciplinary topics. They are picked from various modules: multifunctional forestry, social issues linked to forestry and from the module of elective and advanced courses. Some of them are compulsory, and others are elective. The student should choose six courses from fifteen courses listed below. Every course counts for 3 ECTS credits, thus, our students spends 18 ECTS credits within two years for the Green Module. That is more than ten percent of the total. The full list of these green courses is:

- Climate & Society
- International Environmental Economics
- Green Markets: Voluntary & Information Based Approaches
- Environmental Management
- Biochemistry & Bioenergy
- Green Economy & Green Growth
- Sustainable Development
- Green Finance
- Green Investment in Forestry
- Corporate Social Responsibility
- International Green Infrastructure
- Low-Emission Development
- Ecosystem Analysis
- Multifunctional Forestry
- Internationalization & Globalization in Forestry.

Considerations on the Green Module

Forestry education teaches about climate change and how it affects forests. Forest sustainable management education covers all aspects of environmental protection and restoration. It also includes forest health maintenance, research and product development, and fire hazard reduction. It is critical to stress that the management of forest ecosystem services is modern to the forest sector and has wide perspectives.

Forestry training in field courses helps to ensure that forests are managed in an ecologically sound manner. Future Masters learn the ways to improve and protect forest environments using green knowledge in practice. They also learn how to improve and maintain corporate social responsibility.

We realize that scientific research is a very important part of this programme: students collect their own data for their thesis. They focus on research topics taking into account the economics of sustainable forest management, sustainable development and other topics, going beyond the traditional economic paradigm, and the institutional and evolutionary aspects of forest management. Students have to conduct research into forest's reactions to human impacts, including different forest management practices.

The thesis is the culmination of an individual research experience using new data or information to replicate an earlier study, or analysis of data from another studies, or the product of original research based on primary data. We ask our students to highlight one point where he or she explains the "green" aspects of his or her research. An oral public presentation of the thesis proposal, including a detailed description of the problem and the planned research, has the same assignment, with an accent on "greening" the forest sector.

Graduates of this Master programme should be able to meet the requirements of future national society regarding the conversation of natural resources and environment protection as well as social acceptance, and the transition to green economy.

The demand for specialists in possession of "green skills" is expected to increase in the coming years. Green skills can be described as specific skills required to adapt products, services or operations due to climate change adjustments, requirements or regulations (e.g. water purification and site remediation planning/engineering in mining, solar panels installation, wind turbines design, green management, carbon capture and storage techniques). See for more Martinez-Fernandez *et al*., 2010; LEED, 2012).
In this case one more educational aspect of greening the forest sector is life-long-learning (LLL). LLL is one of the main instruments to achieve strategic goals in sustainable development. Increasing demand for permanent education in all sectors of economy in conditions of fast growth is one of the most important challenges of

the current situation in Russia. Enterprises' investments in continuing vocational or professional training in so-called LLL tracks have improved the human capital resources. LLL is one of key boosts of the economic performance, competitiveness, and employment in Russia.

In this respect vocational training reflects the role of enterprises in resolving labor market imperfections and employment imbalances. Moscow State Forest University has accumulated experience in implementation of international projects in the field of LLL both regarding formal and informal learning. In this field, our university collaborates intensively to offer joint study modules in addition to the existing curricula. To have a comprehensive and critical knowledge of sustainability, individuals must have a strong understanding of the environmental, economic, and social systems affected by their behaviours. In this case, we created several short programmes of two ECTS credits in advanced vocational education (AVE). Their content is quite similar to the green module as described above. Achieving mastery of the course, the participants can earn a certificate. Earning such certificate boosts credibility in the workplace, and provides the foundational knowledge for successful sustainability initiatives or practice both for the company and for the person. These short programmes can be included in the Master programme too.

There is one more critical direction, it is retraining for universities' staff (professors and lecturers), they have to earn certificates of AVE once in five years at least. It is a wide field of work to set up new AVE programmes in collaboration with Russian and foreign universities. MSFU is open for collaboration and ready to invite students and teachers to take part in our initiatives.

Conclusion

Russia is facing new challenges nowadays. They determine the need to modernize the economy, including innovative development and energy efficiency. Our country's priorities in innovation policy are to determine a natural progress way towards sustainable development. We hope that Russian national policy and planning processes will place education as central mechanism for achieving our national economic transformation goals. We hope that our modest steps will contribute to the greening of the Russian forest sector.

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THE EDUCATION SYSTEM FOR FOREST AND NATURE MANAGEMENT IN THE NETHERLANDS

HANS SCHILDERS AND PIETER SCHMIDT

Abstract
To inform the about 4000 people working in the sector forest and nature management in the Netherlands, the educational system from basic school up to and including university was studied and described. Three main pathways can be discerned, the vocational one, the Bachelor (higher professional) one and the Master (scientific) one. Due to many cross-over possibilities build in the system, students can easily switch over and thus - in accordance with their own interests and capabilities - develop an optimal pathway to the labour market. Some future developments are discussed.

Key words: Forest and nature management, educational system, the Netherlands

Introduction

The forest and nature management sector in the Netherlands employs persons having a different educational background. Every individual is well aware of his or her own education, but is often not aware of the education of his direct colleague. Also many employers do not understand the education system very well. Hence, reasons enough for us to make an overview of the situation to inform all people inside this sector[2] and to draw some preliminary conclusions.

The forestry and nature management sector

The forest and nature management (F&NM) sector deals with around 800,000 ha land in the Netherlands, of which is about 40% privately owned (Op de Beek, 2012). In 2003, forests covered about 360,000 ha. In 2010 1,300,000 m3 timber was harvested (Schelhaas *et al*., 2014), which amounts to about 10% of the annual timber use in the Netherlands. The more than 200,000,000 visits annually to forest and nature areas (Kuiper, 2000) indicate that the recreation function may be more important than the wood production function.

There are no reliable figures on the number of people working in F&NM (Aequor, 2013). Colland Arbeidsmarkt, the retirement fund for the forest and nature management sector, receives annually contribution for about 2800 persons. This does not include employees of the State Forest Service (around 800) and quite a few ones with a Master or Bachelor level working for the government, provinces and municipalities in forest and nature policy and management (see Blok *et al*., 2015). It

[2] A version in Dutch was published in 2015 (see Schilders and Schmidt, 2015) for this purpose.

also doesn't include one-person-firms, consultants hired to do a job, nor foreign men or women. LISA (2012) registers offices of companies with people working inside the forest and nature management sector, including the State Forest Service and one-person-firms, which totals about 3450 persons. In conclusion, it can be assumed that about 4.000 people are working in the combined sectors, i.e. forest and nature.

According to LISA (2012), the employees are about equally divided over forestry at the one side and nature management at the other one. The work force is male dominated (see Figure 1) and relatively old (see Figure 2). The number of employees with vocational diploma and those with a Bachelor degree are comparable: 35-40% of the total (see Figure 3). About 15% obtained a Master degree, working about equally divided over forestry and nature management. Of the 40% with a vocational diploma, more than 60% (see Figure 4) studied at the highest vocational level (for an explanation of these levels see below).

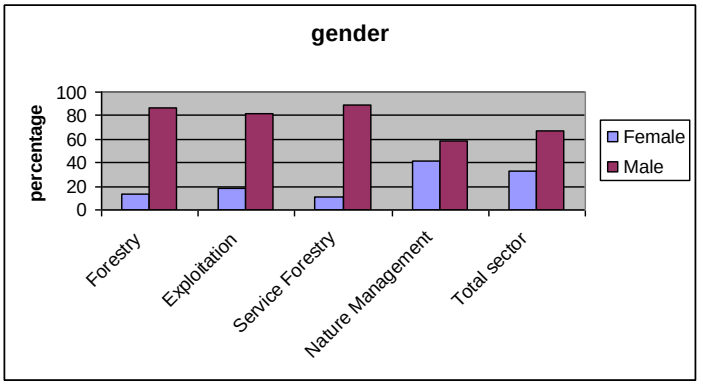

Figure 1: Male and female employees in the sector forest and nature management (LISA, 2102).

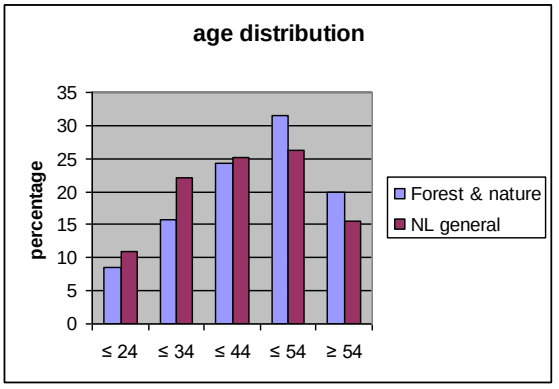

Figure 2: Age distribution of employees in forest and nature management and in the Netherlands (Aequor, 2013).

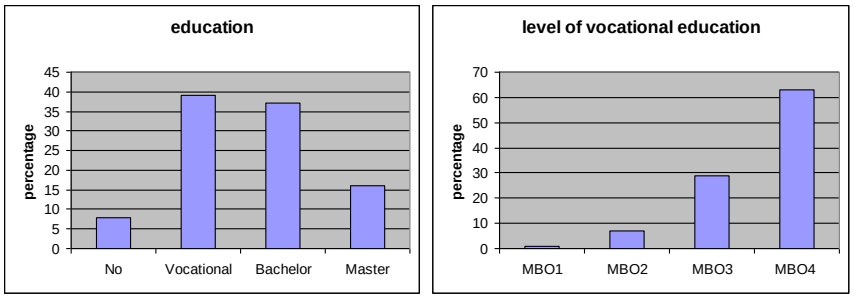

Figure 3: Degrees obtained by employees in forest and nature management sector (left) and level of vocational degrees obtained (Aequor, 2013).

Degree levels

The Dutch Qualifications Framework (NLQF) uses eight levels, from post primary education to university, describing for each level the accompanying knowledge and competencies and the extent of responsibility and independence. In Table 1, a simplified comparison is given between the Dutch (NLQF) and the European system (EQF).

Table 1: The Dutch (NLQF) and the European Qualifications Framework (EQF) (NLQF, 2015).

EQF	NLQF	Dutch Qualification	European Qualification
8	8	Doctor	Doctorate
7	7	Master	Master
6	6	Bachelor	Bachelor
5	5	Associate Degree	Associate Degree
4	4+	VWO	University preparatory education
4	4	HAVO	Senior general secondary education
4	4	MBO 4	Senior secondary vocational education
3	3	MBO 3	Senior secondary vocational education
2	2	VMBO / MBO 2	Preparatory secondary vocational education
1	1	VMBO / MBO 1	Preparatory secondary vocational education
	0	Basis educatie	Primary education

The education system

A drawing of the Dutch education system is given in Figure 5. A first common platform forms the fundament. Students reach at age 12 years the second floor. Above this first platform three pathways have been developed, representing the three main education streams each defined by the exit-level: a vocational, a Bachelor or a Master degree. On top of the latter two, of course, a PhD can be obtained. Cross-over possibilities between the pathways, which could be considered as bridges, are available. The number of exits on the top is limited, but the individual variety inside each exit is large. In the Netherlands education is obligatory for everybody from the age five up to sixteen. The common exit age for the highest vocational level is 17 till 20, for the Bachelor degree 21, for of the Master degree 23 and for the PhD 27 years.

Let us guide you through this education system with special attention to forest and nature management.

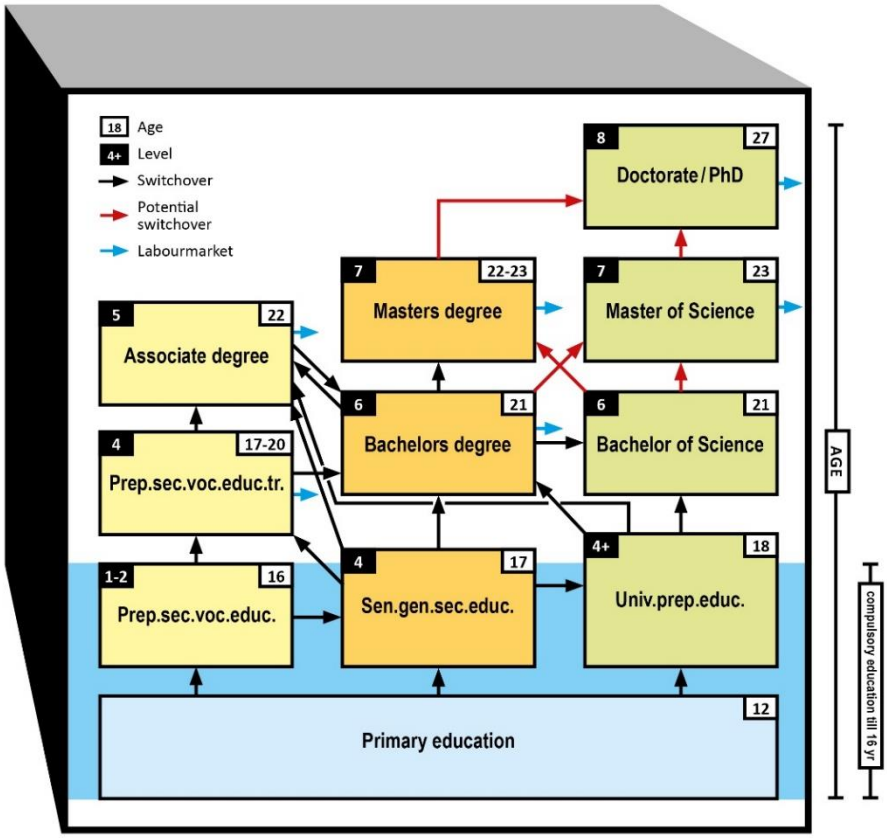

Figure 5: The education system in the Netherlands.

Primary education

Primary education starts with age four and takes eight years. It changes from play via learning through playing to learn. At age twelve pupils go to the second phase and enter one of three main streams, from left to right: the first one is aiming at a vocational degree, the second at a Bachelor degree and the third at a Master degree. The choice for one of the streams is based on the advice of the school. (Parents follow mainly but not always the advice of the primary school in their decision where to send their child). There is some attention for biology and nature during primary education, but the amount of interest depends on the school or teacher. The education is in general in Dutch. In 2013, students at about 100 schools followed a bilingual education (mainly English and Dutch). There is no formal national examination at

the end, but most students write an obligatory national test organised by the school. This primary education has no grade in the NLQF (see Table 1). Only pupils with learning difficulties are not following the standard primary education. They are in special schools, and some of them also find their way to simple, uncomplicated functions inside F&NM. This stream will not be discussed here.

The pathway to a vocational degree (VMBO and MBO)
The entrance to a vocational degree is the preparatory secondary vocational education (Voorbereidend Middelbaar Beroepsonderwijs, VMBO) (see Figure 5), lasting four years. Education starts here with a basic stage (onderbouw) of two years. Students can choose between four different levels 1-4, with increasing amount of theoretical subjects included. Depending on the levels, entrance to one of the four levels of the subsequent senior secondary vocational education is obtained. Some shift even to the senior secondary general education. The VMBO education is in Dutch (as are the related websites) and is finished with a national examination. The level of the VMBO, depending on the level chosen, is 1 to 2 in the NLFQ. The general keyword is craftsmanship. Students of all levels interested in F&NM choose for the third and fourth year the sector agriculture, where a couple of learning tracks are offered more specialised on aspects of forest and nature management.

Table 2: Preparatory secondary vocational education schools with attention for 'green[3]' education. Websites addressed August 2015.

Helicon Opleidingen (www.helicon.nl)	Wellant (www.wellant.nl)
De Groene Welle (www.groenewelle.nl)	Citaverde (www.citaverde.nl)

Four schools offer learning tracks with attention for 'green' (Table 2). Those four schools offer education in F&NM in some form at the next level of senior secondary vocational education too.

With the final diploma of the VBMO, pupils can enter the senior secondary vocational education (Middelbaar beroepsonderwijs, MBO). Depending on the level (1 to 4) of their VMBO diploma, they can enter the matching MBO level (see Table 3).

The MBO education is in Dutch and takes 1 to 4 years with an official school diploma. Due to a ministerial decision in July 2015, the duration of the level 4 education will be restricted to three years. Relatively new is the strong link to the local labour market. In the MBO practical experience is of uppermost importance. Students have to choose between

- a work-based route (escort to a profession, beroepsbegeleidende weg, BBL) during which students spend at least 60% of their time working in a company, the balance at school, or

[3] 'Green' includes here agriculture, nature management, forestry etc.

- a school-based route with full time learning (education to a profession, beroepsopleidende weg, BOL) during which students spend between 40 and 80 % of their time at school, the balance as intern worker at a company.

Table 3: Learning levels of the senior secondary vocational education.

VMBO level	MBO level	Years	General description training*	General description function*	Functions inside F&NM	Level in NLFQ
1	1	0.5-1	Assistant training	Assistant	--***	1
2**	2	2-3	Basic vocational training	Worker	Field worker forestry, nature management, recreation	2
3**	3	2-3	Vocational training	Skilled or all round worker	Skilled worker forestry, nature management etc.	3
4**	4	3-4	Management training	Assistant or middle management	Ranger, teamleader	4

*: Source and for more information see http://cs.s-bb.nl/ (addressed August, 2105).
**: Is considered as an entrance to the labour market.
***: mainly, graduates from special education work here.

Table 4: MBO schools and specialisations (various levels) inside the sector F&NM. Translations of the titles by the authors. Websites addressed August 2015.

Helicon Opleidingen (www.helicon.nl)	**Wellant (www.wellant.nl)**
Forest & Nature	Green, Recreation & Tourism
Eco- & Wildlife	Land, Water & Environment
Land, Water & Environment	Men, Nature & Health
Outdoor & Adventure	Urban Green & Nature Management
Applied Biology	Urban Green, Forest & Nature Management
Sheppard	Water Management
Water Management	
Tree Care	**Citaverde (www.citaverde.nl)**
Natural Environment Worker	Environment
Environment & Space	Nature, Water & Recreation*
	Garden, Park & Landscape
De Groene Welle (www.groenewelle.nl)	Contractor Soil & Infrastructure
Forest & Nature Management	
Green, Soil & Infrastructure	

*: former title Forest & Nature

An overview of the various MBO curricula inside the sector F&NM as offered by again four schools is given in Table 4. This list is not exhaustive and not all curricula can be followed at all levels.

A relatively new development is the “Associate degree”. This degree is a next step for graduates of the MBO-level 4 and leads in two year to a diploma at the NLQF level 5. These curricula are taught at universities of applied sciences (see below).

The first step of the pathway to a Bachelor or a Master degree
The entrance to a Bachelor or a Master degree for graduates of the basic education is the general secondary education, which consists of two pathways: the senior general secondary education (Hoger Algemeen Voortgezet Onderwijs, HAVO) and the pre-university education (Voorbereidend Wetenschappelijk Onderwijs, VWO) (see Figure 5). These two – different – curricula, taught in general in Dutch, take five respectively six years and end with a national examination in 3-4 profiles, ranging from social to natural sciences. In all subjects the examination has to be passed with at least the grade "satisfactory".

The junior stage lasts three years and consists of general subjects for all pupils. During the senior stage pupils choose their own pathways: The six or seven subjects are combined in so-called profiles, Culture & Society, Economics & Society, Science & Health and Science & Technology. Graduates from the latter three are accepted at for F&NM study programmes, from the first profile only under some conditions. The HAVO diploma is positioned at the level 4 of NLQF; the VWO diploma at level 4+ (see Table 2).

Higher education
The entrance to the higher professional education (Hoger Beroepsonderwijs, HBO) at universities of applied sciences (Hogescholen) or to the scientific education (Wetenschappelijk Onderwijs, WO) at research universities are respectively the HAVO and the VWO diploma. Graduates from the first year HBO may obtain admission to WO curricula under condition of an adequate level for some courses, as may graduates from the MBO 4 level diplomas to the HBO. As only a limited number of both university types (about 15 research universities and about 50 applied ones) are relevant for F&NM we will restrict the discussion below to these universities.

The pathway to a professional Bachelor and Master of science In general, HBO study programmes are aimed at "the transfer of theoretical knowledge and the development of skills that are closely linked to the professional practice". About a dozen years ago, study programmes were reformulated on a Bachelor/Master basis and the former ING diploma declared equal to the professional Bachelor degree. Four universities of applied sciences (see Table 5) are relevant for the sector F&NM, of which Hogeschool VHL (Van Hall Larenstein University of Applied Sciences) offers the largest variety in for F&NM relevant study programmes.

The Bachelor study programmes at universities of professional education take four years and are divided into a propaedeutic of one year and a main programme of three years. An obligatory internship of nine months (at Hogeschool VHL) is placed in the third year, followed in the fourth year by a graduation project or a final paper. A number of these study programmes can be studied also in part-time, in combination with a job. This Bachelor degree is placed at level 6 of the NLQF (see Table 1). Graduates have entrance to the MSc programmes (one of two years) at for instance Hogeschool VHL and may be admitted under some conditions to MSc programmes

at research universities. However most students with this Bachelor diploma enter the labour market.

Table 5: Four universities of applied sciences with Bachelor study programmes relevant for F&NM sector. Translation of the titles by the authors. Websites addressed August 2015

Van Hall Larenstein (www.hogeschoolvhl.nl)	**HAS Hogeschool (www.hashogeschool.nl)**
Forest & Nature Management1	Landscape Design
Coast & Maritime Management	Environmental Sciences
Land & Water Management	Development of Town & its Surroundings
Environmental Sciences	Applied Biology
Management of the Living Environment	Garden & Landscape Management
Garden & Landscape Architecture2	
Soil Sciences3	**CAH Vilentum (www.citaverde.nl)**
	Biology, Plant & Nature
InHolland (www.inholland.nl)	People, Nature & Education
Landscape & Environment Management	

1: Six specialisations: Tropical Forestry, Forestry & Urban Forestry, Nature & Landscape Engineering, International Timber trade, Land & Property transactions, People & Nature.
2: Including Associate Degree Garden & Landscape Architecture.
3: Including Associate Degrees Sustainable Water Technology and Sustainable Soil Management.

Hogeschool VHL offers in the sector F&NM the MSc programme Project & Process Management in the Green Environment. This programme can be studied full-time or part-time. The accredited diploma is placed at level 7 of the NLQF.

Universities of applied sciences offer associate degrees programmes (see above) to excellent MBO level-4 graduates and to people with already some work experiences wanting to improve their qualifications and competences for their employer and or the labour market. These two years programmes aim at a diploma placed at level 5 of the NLQF and can be studied full-time or half-time. In the Sector F&NM only Hogeschool VHL offers some programmes (see Table 5).

The pathway to Bachelor of Science, Master of Science and Philosophical Doctor
Since the implementation of the Bologna process education at research universities in the Netherlands are divided into three study cycles: the Bachelor of science of three years, the Master of science of one to two years and the Philosophical doctor of four years. The main pathway to a job in F&NM, at least the only one with Forest & Nature Management in the title, is located at Wageningen University (WU) (see Table 6). Of course, graduates from other study programmes at WU or at any other university in the Netherlands can fulfil more specialised positions inside F&NM. However, here only the WU study programmes will be discussed.

Admission to the BSc study programmes is given on the basis of the VWO diploma, for the WU-BSc F&NM automatically with the profile Science & Technology and Science & Health . The BSc programme has a duration of three years. Students have to choose between two majors, including a small thesis, and have to do a minor of six months. The diploma is positioned at level 6 of the NLQF (see Table 1). According

to the ideas of the Bologna process, this BSc should be accepted by the labour market but that is not a reality. Graduates have now (2015) unconditional admission to the subsequent WU-MSc Forest & Nature Conservation, and some other MSc programmes like Geo-information Science and Climate Studies.

Table 6: BSc and M.Sc. study programmes for the sector F&NM. Websites addressed August 2015.

Wageningen Universiteit (www.wageningenur.nl)	
BSc study programme	Forest & Nature Management1
MSc study programme	Forest & Nature Conservation2

1: Two majors: Policy & Society, Ecology & Management.
2: Three specialisations: Ecology, Management, Policy & Society.

Admission to the MSc study programmes is given on the basis of the BSc diploma, for the WU-MSc study programme automatically for BSc graduates Forest & Nature Management. Other graduates with a Bachelor degree, including the Bachelor diplomas of universities of applied sciences will only be accepted under specific conditions. The flexibility is high. Presently, two-thirds of the F&NM BSc graduates continues in the F&NC MSc, one-third continue in other MSc programmes, be it at WU, be it elsewhere. Out of the students in the WU F&NC MSc programme, one-third are F&NM BSc graduates, one-third comes from other universities (equally from research universities and from universities of applied sciences) and one-third comes from abroad.

The curriculum length is two years, including an internship and a six month's thesis. The MSc diploma is positioned at level 7 of the NLQF (see Table 1). This diploma allows an admission to the PhD programme and an entrance to the labour market. The PhD programme normally has a length of four years and inside a given framework completely individually chosen.

More details of the BSc and the MSc study programmes at WU are given in Blok *et al*. (2015) and Epema *et al*. (this volume). Details of the PhD programme at WU are given by van Laar (2014). Of course, at research universities other than WU dissertations in subjects relevant for F&NM are written in other disciplines. Authors can find jobs inside F&NM.

Cross-over possibilities
As indicated in Figure 5, there are quite a lot of cross-over possibilities (bridges) built in this system. The 'normal' way is indicated with straight vertical arrows, following the 'normal' pathway inside one education stream. It is quite easy to go from left to right in Figure 5 or from Bachelor of science to professional Bachelor and or to vocational education. Reasons for such a move could be the interest of the student, the learning capabilities of the student or market chances. These decisions will be taken in discussion with the study advisers of both the programmes. It is a little bit more difficult to move from right to left in Figure 5. Usually additional requirements exist. The reasons for such a change are probably the same, but consultations with the study-director (-board) of the new study programme are necessary. It may be

possible that the student has to take some additional courses, to compensate for required courses missing. For crossing over from for instance from Hogeschool VHL to WU, WU-knowledge of the discipline, knowledge of English and three grades of at least seven in a range from 0 till 10 are needed. Only the disciplinary knowledge (F&NM) can be brushed up.

In any case, this moving up and moving down possibilities ensure a very flexible system, allowing students to find the optimal pathway for themselves, depending on their qualifications, interest, learning power, skills and competences.

Lifelong learning

The description of the education system for F&NM is not complete without attention for changes in the Dutch labour market, for changes in the sector F&NM and its labour market and thus for lifelong learning.

The proportional increase of the ageing population, the diminishing share of the employed population, the raising of the retirement age and the individualisation of the society influence the general labour market and thus too the one for F&NM. Specific aspects relevant for F&NM - adapted and translated from Aequor (2013) - are:

- Increasing demand for timber resulting in more attention for timber production and silviculture;
- Cutback in governmental expenses for nature management, resulting in a growing need for societies owning and managing nature and forest areas to generate income;
- Decrease of the employment possibilities;
- Scale enlargement (larger firms, area's) , shift in labour supply and its diversity;
- Increasing attention for environment and sustainability;
- Increasing importance of forest and nature for recreation and tourism;
- Increased linking of nature with economy, health, tourism and recreation;
- Increased attention by employers for craftsmanship and entrepreneurship;
- Large percentage older employees prohibits moving up;
- Increased use of volunteers.

Schools have to and are reflecting on these developments. Increasing contacts between schools and the participants on the labour market (employers and employees) stimulate movement here, and not only on the level of the study programmes discussed above. Employees on the one hand have to ensure that they stay attractive for employers, be it in the same or in another company, upgrading and renewing their skills and knowledge. The employers on the other hand have to ensure that their companies and the employees in it can work according to the highest and newest standards for economy, safety, health, etc. This holds too for the relatively

conservative people working in the sector F&NM. This all can be summarized under the key word lifelong-learning (see also Onderwijsraad, 2015).

'Without schooling no sustainable forest management!'. This is the title of the article (Jansen, 2013) pleading for something like a 'certified forester' granted by a forestry guild. The title certified forester should only be given and maintained if the person concerned maintains and improves his knowledge continually. Scotland, Spain and the USA use this approach. This concept fits nicely in the concept of lifelong learning but did not yet materialise in the Netherlands.

Concluding remarks

Looking at the education system for the sector forestry and nature management, one could conclude that this system functions relatively well. It is flexible due the different end terms and due to the cross-over possibilities. The large variety of (options within) disciplines is positive. From a student's point of view: students can find the optimal final station of their education pathway regarding their qualifications, interests and learning capabilities and so prepare themselves optimally for the labour market. The employers will find on the labour market a large diversity of graduates with different skills, knowledge and experiences to select the best one for the opening they have.

Of course, making the connection between education, the labour market and the employers is laborious, employers are not always satisfied with the way the education fits their requirements. Contacts between the two are becoming more intensive at the moment which may help here. It is good, however, to realise that the education for employees in the sector forest and nature management is only a small part of the total education system. The dynamic labour market demands on the other hand that schools remain innovative and in close contact with the labour market to ensure the education of well qualified graduates for the sector.

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HARMONISING PART-TIME DISTANCE-LEARNING AND FULL-TIME RESIDENTIAL MSC FORESTRY PROGRAMMES

MARK RAYMENT

Abstract
The aim of this paper is to describe how Bangor University is adapting to the changing needs of higher-level forestry students and to the changing opportunities afforded by developments in learning technologies. Increasingly, students are unable, or unwilling, to forgo earning opportunities in pursuit of learning opportunities, and some are choosing to study at Master's level through part-time, non-residential programmes. These students are often already engaged in the forestry sector. Through a mixture of innovative teaching methods and technology-enabled versions of existing teaching methods, we ensure a parity of experience between part-time distance-learning students and full-time residential students. Whilst there are costs and challenges in developing and teaching programme components (modules) that "fit" into multiple programme modalities, we find that a synergy exists between the two cohorts of students. Part-time non-residential students working in the forestry sector provide real-world context and demonstrate professional standards to the full-time students, and the full-time students provide a fresh perspective and academic energy to the part-time students. Consequently, reported satisfaction from both cohorts of students is higher than that reported for the old style, cohort-focussed predecessor modules.

Key words: UK, MSc, forestry, part-time students, full-time students, distance learning, teaching methods.

Introduction

Although forestry has been taught as an academic discipline in UK universities for over 110 years (Anon, 2014), recent years have seen a decline in the number of universities offering the subject at higher (Master's degree) level, with notable institutions such as the University of Oxford and Edinburgh University withdrawing their MSc forestry programmes. Such a decline is not common across Europe, as evidenced by the membership and continued activity of the SILVA Network.

Forestry is not a high profile occupation in the UK, particularly among school-aged children, and enrolment has always been limited to around 100 students per year (Roger Cooper, pers. comm.). In general, therefore, two student "archetypes" can be identified: 1) School leavers, and 2) "Mature" students. School leavers enter university directly from school at 18-years onto programmes that attract government subsidised loans. Recently the best students enrol on 4-years MFor programmes which lead to a Master's level qualification. Mature students often enrol directly on

a Master's level programme either to change career into forestry or to further their existing forestry career. In either case, the UK government does not offer financial support for postgraduate education, so mature students are predominantly self-funded with a small minority receiving funding from their employer for career-development.

Changing times

In recent years, increasing career and financial uncertainty has meant that mature students are unable, or unwilling, to forgo existing earning opportunities in pursuit of learning opportunities, and are choosing to study at master's level through part-time, distance-learning programmes rather than full-time residential programmes (Figure. 1).

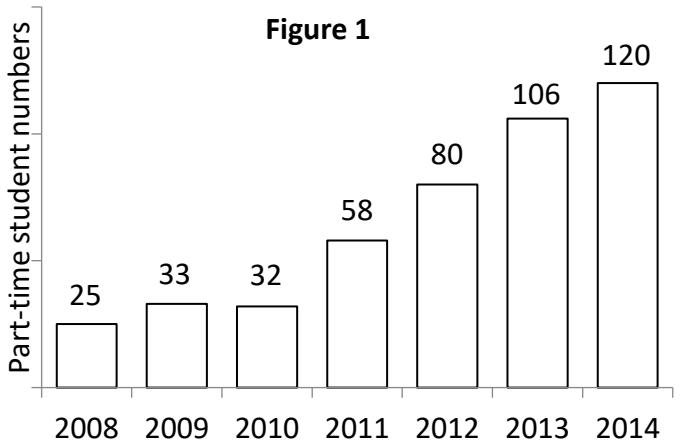

Figure 1. Increasing number of part-time students on Bangor University MSc forestry programmes.

Since 2014, UK universities no longer receive government "top-up" funding worth up to £6500 for STEM (Science, Technology, Engineering and Maths) subjects, including forestry for each student enrolled on a Master's programme. The result of this funding cut has been that universities must inevitably either increase fees, or reduce costs.

Partly because of Bangor University's unique establishment history (Roberts, 2009) the University has sought to maintain fees at previous level, and to reduce costs through increased efficiency, via mechanisms such as the sharing of modules across multiple academic programmes. For example, in previous years, two distinct silviculture modules were taught – one aimed at full-time residential students, and one aimed at part-time distance learning students. This clearly occupied more staff time compared to teaching a single module and presented an opportunity for cost saving. The primary constraint is that any change, i.e. replacing two modules with a single module, needs to be done without detracting from individual students' learning experiences.

Blended learning – twin challenges

In the UK, taught Master's programmes are typically made up of discrete modules, each of between 5 and 10 ECTS. In Bangor's forestry and related programmes, these module are characterised as either knowledge-based, where learning derives from instruction (e.g. silviculture, forest ecology, forest resource assessment, forest history, policy and management) or competence-based, where learning derives from example (e.g. management planning, research planning and communication, natural resource management, natural resource development). Students complete an equal number of knowledge- and competence-based modules, and it is the modular structure of the degree programmes that facilitates the content sharing that generates savings.

Although it appears straightforward to exchange one module for another, significant challenges exist in blending the learning of full-time and part-time distance-learning students. Firstly, the rate of student progression differs between full- and part-time students, with the latter typically earning credits at 1/3 the speed of the former. In Bangor, we have accommodated this by designing programmes in which full-time students study three long/thin modules simultaneously, whilst part-time students study a single long/thin module. A consequence of this, however, is that the differing sequencing of modules requires a balancing of interests between the two cohorts with a clear consideration that any pre-requisite knowledge is achieved ahead of more complex material, whether in a 1- or 3-year-programme. Secondly, the expectations and experiences of full-time residential and part-time distance-learning students can be different, and it is essential that any common module fulfils the needs of both, i.e. that it provides a parity of experience.

Delivery format is key to an effective solution

Through a mixture of innovative teaching methods and technology-enabled versions of existing teaching methods, we have designed modules that ensure a parity of experience between part-time distance-learning students and full-time lecture-room-based students. To illustrate this point, we will consider the single silviculture module that replaced both the full-time live-lecture-based silviculture module, and the text-based distance-learning silviculture module.

The complete silviculture curriculum was divided into 8 units:

- Silviculture and its role in forestry;
- Silvicultural basics (biology/botany);
- Soils, site classification & species/site matching;
- Regeneration;
- Thinning, tending & harvesting;
- Silvicultural systems;
- Silviculture in integrated production systems;
- Conversion, transformation & restoration.

The learning materials for each unit are made available via the Blackboard Learn VLE (virtual learning environment) (Blackboard Inc, 2015) and each consists of:

- 20 – 30 page unit downloadable booklet containing:
  - Essential pre-reading,
  - Lecture notes,
  - Further reading.
- Lecture – streamed live and stream-able and downloadable versions are made available afterwards.
- Self-assessment questions with answers automatically revealed following completion.
- On-line focus group work (one topic per group). Focus groups are deliberately constructed with a mixture of part-time and full-time students. Each group hosts an online discussion forum.
- Student-led seminar (6 days after lecture) in which a summary of the focus group work is presented. Presentations are either made in the classroom by a full-time student, or previously recorded and uploaded when delivered by a part-time student. Similarly to lectures, seminars are streamed live with all students following and interacting, via instant messenger if not present. Videos are made available for download afterwards.

Student learning is assessed through two pieces of work, a conventional term paper (essay) and a novel 24-hour exam. The exam paper is made available simultaneously to all students online, and students have a 24 hours long window to submit their answers. The exam is "open book" meaning that students may access lecture notes, online resources and the scientific literature when constructing their answers. Thus the work submitted by the students is expected to be of the highest standard of accuracy and presentation, and be fully referenced. This exam model is designed to be more representative of real-world working conditions. Parity of experience of student experience is maintained by ensuring that all group-work discussion, including staff input, takes place online, and all work is submitted electronically. Non-residential students have exactly the same opportunity to provide input either live, via instant messenger, or by uploading video presentations.

Inter-student synergy

Teaching online is NOT a low cost option and it is important to recognise that there are costs and challenges in developing and delivering programme components (modules) that "fit" into multiple programme modalities. The quality of freely available internet-based resources means that students expect professional quality materials (unit booklets, lecture capture and accessibility) and efficient learning management system (Kannan and Andres, 2010, Malinovski *et al.*, 2012), and developing these requires a significant investment of preparation time as well as time spent achieving new technical skills. The *organisational* skills required to deliver across a range of media are also significantly higher than traditional lecture-based teaching. As students have commented,

"I understand the willingness of the university to integrate DL [distance-learning] students into the classroom via Panopto [a live-streaming video platform], but then the tutor needs to be skilful in managing that communication", and
"I did find sometimes that if lecturer stopped to answer a DL student's Panopto question it would break the rhythm of the thought being delivered – not always, but occasionally"

Importantly, lecturer *engagement* in the online discussions is ESSENTIAL. This engagement is often at a low level and in the background, but it must be continual to ensure that momentum is maintained – particularly in the early days of each module.

Despite these costs, however, teaching online IS a high benefit option. Although up-front time investment is high, the effort for yearly updating of material seems to be reduced, partly because it is more straightforward to revisit previous lectures and identify which areas worked well, and which require review. Most importantly, however, compared to old style, cohort-focussed, predecessor modules, reported satisfaction from all students is enhanced (Table 1).

Table 1 - Student satisfaction scores – 2014 two modules taught independently, 2015 a single composite module taught.

Overall I am satisfied with the module…	**2014**	**2015**
Definitely agree	15	32
Mostly agree	20	24
Mostly disagree	0	1
Neither agree nor disagree	2	1
Overall satisfaction	82%	90%
Number of students enrolled	37	58

This enhancement seems to result from a synergy between the two cohorts of students. Part-time, non-residential students working in the forestry sector provide real-world context and demonstrate professional standards to the full-time students, and the full-time students provide a fresh perspective and academic energy to the part-time students.

Full-time students say:
"The discussion forums were a good method of gathering useful information from people with a variety of backgrounds"
[I benefitted through gaining] "knowledge collaborating with long distance students",
[it was helpful] "being able to download the Panoptos" [online lectures],
[compared to other modules] "excellent material available online especially the unit booklets",

[I] "very much appreciate being able to put things into context and communicate with other students",
[I benefit from working with] "students … from different backgrounds".

Part-time students say:
[it is] "good to have access to lectures that support course material"
[it is stimulating to] "be confronted with other students' opinions, vital in a Masters level course."
"Lecturers feedback and additional guidance in the forums was extremely useful and encouraging"
[excellent] "discussion groups and access to e-resources. Open access to tutors through email"
"…the group interaction fostered on blackboard is most valuable as it helps to bring a number of views to the table on many of the concepts introduced by the various units"
[video lectures] "play a valuable role in making DL feel part of the course. In conjunction with this the discussion boards make interaction with fellow students straight forward."

From a teacher's perspective, several points are salient. Firstly, there was no reduction in the overall time required to run the module. Indeed, by increasing the number of students on the module the time required for assessing student work was increased. This, however, this was significantly offset by the fact that one module had replaced two modules, so overall the administrative burden was halved. Secondly, the broader range of students engaging with online discussion forums resulted in discussions that were broader, livelier, and ultimately more rewarding (and more motivating) for the staff involved. Finally, because a greater proportion of the interaction took place online, there was a reduced requirement for staff to be physically "in the office", facilitating staff travel. In this case, some of the module was taught with the staff member responsible conducting fieldwork in Indonesia.

Teaching quality is formally assessed through an annual quality assurance process involving independent staff from within the academic school, staff from elsewhere in the university, and an expert from another independent university. The evidence that is drawn upon for this assessment includes students' anonymous evaluation (completed online) with both quantitative and qualitative responses (Table 1, and student responses above) as well as a statistical analysis of student performance across modules and between years. Perhaps the most instructive indicator of the effectiveness of this model of teaching is that a similar model has been adopted for other full-time modules (Agroforestry Systems and Practice; Natural Resource Management, Management Planning, Research Planning and Communication) enabling these to be made accessible to part-time distance learning students. Looking forward, this will become the standard mode of teaching for both knowledge-based and competence-based modules.

Conclusion

In summary, the world is changing, but the demand for knowledgeable and technically skilled foresters remains high. Full-time education remains the luxury of the financially secure, and the demands of financial prudence are felt no less acutely by the universities themselves. Nevertheless, we have been pursuing the mission of forestry teaching for the last century and longer, and active and creative engagement with learning technologies and the new media will allow us to continue our mission into the future.

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MOBILE LEARNING AT BOKU: FIRST EXPERIENCES FROM FORESTRY EDUCATION

CLAUS RAINER MICHALEK

Abstract
Within the last eighteen years classical e-learning has become an integral part of teaching and learning at the University of Natural Resources and Life Sciences (BOKU), Vienna. While smartphones and tablet computers are widely used today, these mobile devices could also be an addition to BOKU's teaching and learning. Within the scope of a doctoral thesis, in collaboration with the Technical Universities of Vienna and Graz, it is currently examined how mobile learning could be implemented at BOKU. A first field test with the prototype "BOKU grasp" was carried out in the 2015 summer term course Harvesting Systems. The results show a mixed picture. While the general acceptance was rather low, those students who actually used the mobile tool did it late at night indoors in their leisure time. The major obstacle did not seem to be the low wireless data connection for mobile phones but the insufficient didactical integration.

Keywords: e-learning, blended learning, mobile learning, mobile devices, forestry education, Austria.

Introduction

At the University of Natural Resources and Life Sciences, Vienna (BOKU) e-learning has been used since the late 1990s and is now a well-established and integral enhancement of all bachelor and master programmes. Despite this fact, today's teaching and learning at BOKU does take very little advantage of a recent development which is increasingly gaining in importance, namely the frequent use of mobile devices among the students. Smartphones and tablet computers are not only a versatile tool for communication and organisation of studies, but they also provide a great potential to facilitate learning processes.

The first steps of the introduction of mobile learning were taken in winter term 2012/13 with the introduction of "BOKU vote". The software-based personal response system is a simple but effective way to activate students and get instant feedback, especially in large classes. Teachers can ask questions with up to six possible multiple-choice answers which are displayed via video projectors to the audience. The students can vote anonymously using their mobile devices. The didactical integration in the lecture is important, especially the timing of the questions. Research shows that students prefer end-of-chapter-questions to in-chapter-questions (Fels, 2008). The feedback at BOKU has been encouraging so far, as one teacher summarizes: "BOKU vote has been received very positively. The fan

community even actively demanded it. After the class students told me that it is real fun to vote“ (Kunesch, 2014).

A subsequent step towards a mobile learning application focusing on the pedagogical needs at BOKU was the development of a prototype which could eventually lead to a real mobile app designed for smartphones. Since the role of the technology is merely that of a facilitator, the primary task for the design stage was to get a clear picture of the learning problems of the students. Therefore, much attention was paid to involve teachers at a very early stage. “Interviews with teachers revealed that many students have problems when it comes to comprehending formula-based correlations with several variables. Although the students succeed in applying the formulas, they neither have a clear idea how strong the influence of the individual variables is on the final result, nor about their mutual interference. Furthermore, they often cannot even estimate the relevance of the final result. The formula remains abstract. Thus learning is neither effective nor sustainable.” (Michalek and Csanyi, 2016)

Theoretical background

As one of the wanted learning outcomes for the forestry students is to quickly estimate the economic value of a forest stand in situ, the formula alone is not very helpful. More important would be that the students understand the interaction of the variables and how they contribute to the final result.

The human brain is a “rule-extraction machine” that learns from a multitude of similar examples to generalise and create its own rules. As a prerequisite for this act of abstraction, the environment must already contain a set of rules that can be extracted and consequently applied for similar events (Spitzer, 2002). Abstract things, like in our case formulas, cannot be directly saved as a rules, but must be trained from input-output-mapping that follows these rules (Spitzer, 2000).

If technology could enable the students to do many iterations within a very short time, their brains can be actively supported to build their own abstractions and grasp the underlying formula that is a model of the real world. The students could change the values of the variables as illustrated in Figure 1, rather than calculating with the formula. At this point the formula would not be necessary anymore, since the characteristics would have become meaningful themselves.

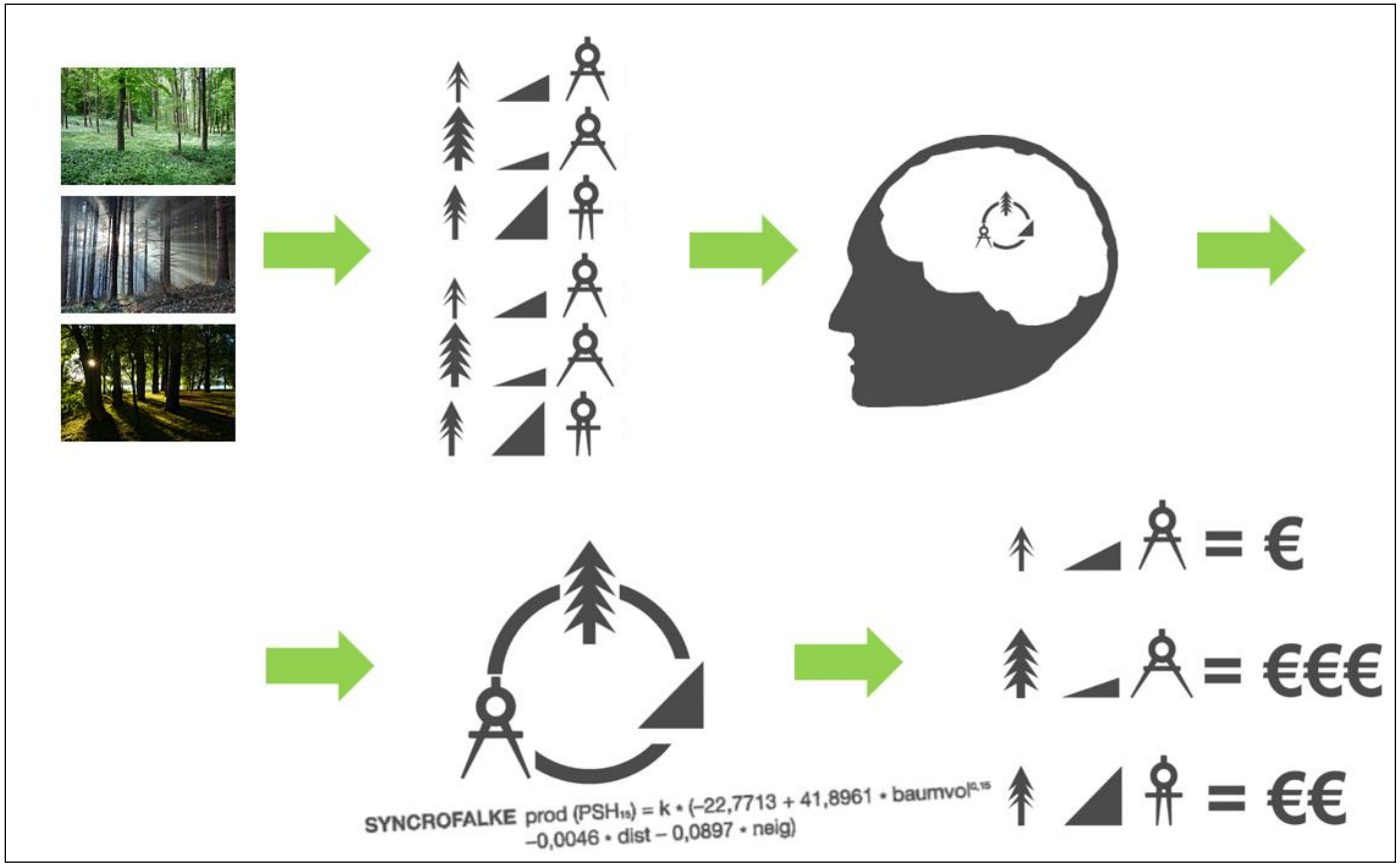

Figure 1: Learning in the forest through abstraction (Michalek and Csanyi, 2016); first photograph by BOKU, the second and third by Christian Kanzian; all licenced under CC-BY-ND). The formula provides an estimation of the system productivity "prod (PSH15)" of a Syncrofalke cable crane comprising a constant "k" and the variables "baumvol" for the average tree volume, "dist" for the hauling distance and "neig" for the slope.

Methods

The didactical ideas developed closely together with the teachers led to a first prototype. The main function is the visualisation of a complex mathematical relationship between several variables that can be modelled with a formula. By changing the variables and getting instant feedback in a series of many iterations in a very short time the students should be enabled to get - with the help of mobile devises - a feeling for the functioning of the formula by using their hands as well as their brains. Therefore the name "BOKU grasp" was chosen.

In the phase of development, it was necessary to quickly implement changes and additional features. For this reason, the prototype of "BOKU grasp" was not a real mobile app but a responsive website meaning that it automatically adapts to the resolution and orientation of the device. While being beneficial from a technical perspective, it had some practical disadvantages in the forest as described below.
Students need to register and login, but they are free to use any e-mail account they want. The main purpose of the use of accounts is to create unique data for later learning analytics. Students are informed about this fact beforehand. Enabling the students to set back their password in case they forget it is a positive side-effect. In the mobile application students can access the different formulas, each of which can consist of several tasks. When opening a task students are asked to indicate two dimensions of the learning situation: the learning location (in the woods, in a seminar room or at home, to name a few examples) and if they are learning alone or teams. This data is collected for scientific research.

The first section of the mobile app is devoted to a basic introduction into the formula and all the variables involved. As illustrated in the Figure 2, every variable has its own distinctively different colour which is used in the explanation of the formula, the slider controls to set the values as well as in the presentation of the results as a table. Since most mobile devices have touchscreens the variable values very can be altered very intuitively with the help of the slider controls, but the direct input of numbers is possible as well. The value of the parameter is symbolised by icons that alter correspondingly to the set values providing students with an immediate feedback. Thereby, abstract numbers are translated into meaningful pictures.

The educational core is the section where the results are displayed in various forms: in actual numbers, but also in a three level colour code indicating poor, medium or good results of the formula. Furthermore, the history of the results and combinations for refection are displayed in a graphical presentation and as a table. The students can go back to every combination by clicking on the result of an attempt in both forms of the presentations mentioned. The students can apply the formula many times very quickly. Since the calculations are done by the mobile app, the students can fully concentrate on reflecting their combinations and grasping the practical meaning of the formula.

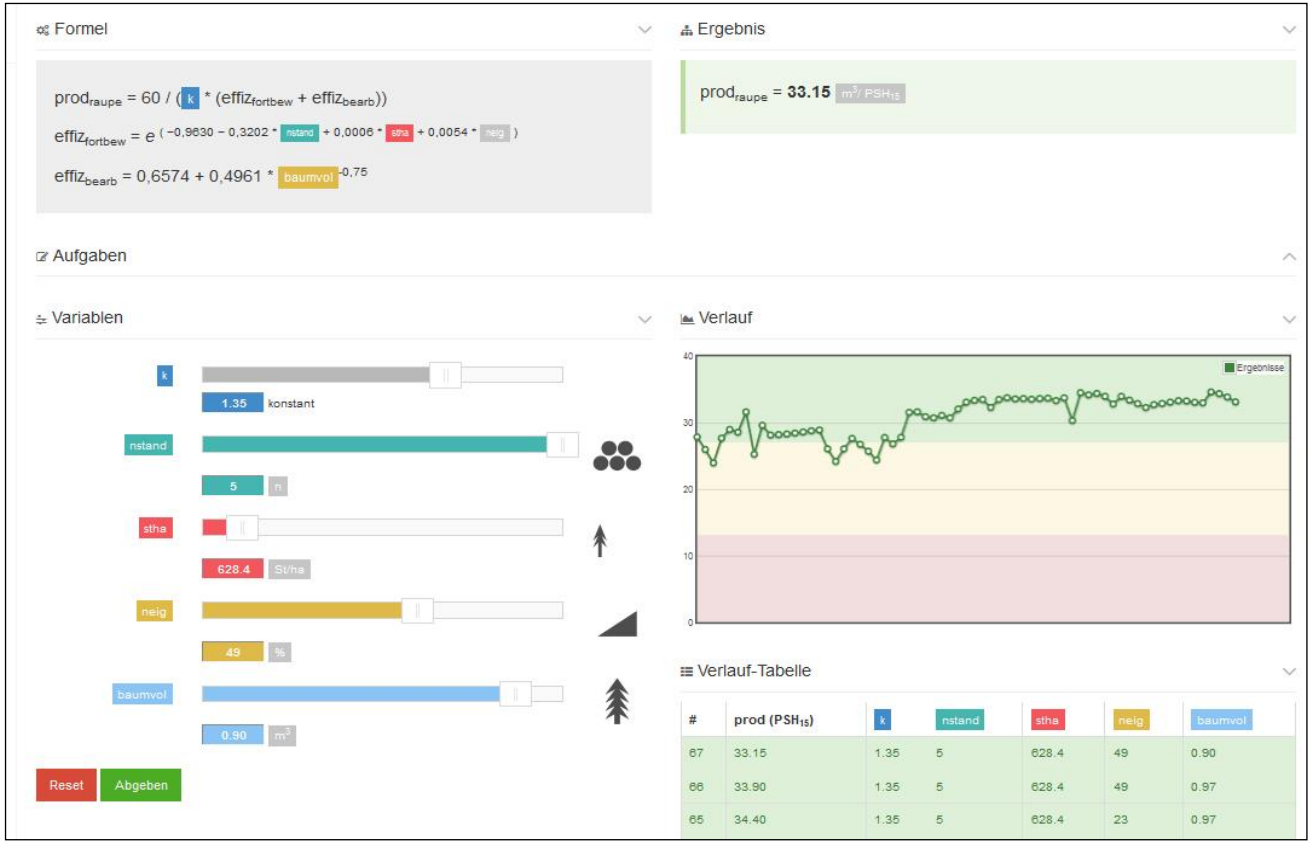

Figure 2: Screenshot of "BOKU grasp" depicting the formula, the tasks (this section is collapsed), the slide controls and the visualisation of the results in three forms. The formula provides an estimation of the system productivity "prodraupe" of a Valmet 911.1 X3 M Snake harvester comprising a constant "k" and the variables "nstand" for the number of trees harvested per strop, "stha" for stand density, "neig" for the slope and "baumvol" for the average tree volume of the stand.

After the completion and submitting a task, students have the opportunity to immediately evaluate the application with two yes-no questions asking them if they liked it and whether it helped them to better understand the relationship, followed by an open field for further comments.

First field tests with the prototype "BOKU grasp" were carried out during the course "Timber Harvesting Systems" in the summer term of 2015. What are the experiences so far? The major obstacle was the insufficient didactical integration. The consequence was: the students had not enough time in the forest to try the mobile application in the real situation. But a few students did it late at night indoors in their leisure time. Moreover, there were some spots in the forest with insufficient wireless data connection for mobile phones. Being a responsive website the data connection is vital, leading to long loading time and poor usage by the students.

Conclusions and outlook

What are the next steps? Further investigations are needed asking the students about their learning habits. Considering the poor wireless data connection in some forest spots it is necessary to programme a real mobile app that does not need to be online all the time. What is even more important is the didactical integration. The use of the mobile app must be a formal part of the course rather than a voluntary addition. This can only be achieved with the help of the teachers.

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LIFELONG LEARNING IN FORESTRY: A SHORT SUMMARY OF TRENDS IN SPAIN

CRISTINA VEGA-GARCIA, JORGE ALCÁZAR

Abstract
Since the reform in 2009, Forestry Schools (16) in Spain provide a very similar four-year generalist programme in Forest Engineering. In application of the legislation relative to this regulated profession, little room is left to specialization, which is basically restricted to a few ECTS credits during the fourth year. Specialization is supposed to be achieved at the MSc level, or through lifelong learning (LLL) programmes. MSc programmes are designed for duration of at least a few years, and require accreditation by the Ministry of Education in Spain. LLL programmes, on the contrary, are more dynamic in nature, depend only on the university senate's approval, may involve non-university instructors, and can be structured on different levels, ranging from one-day seminars to Master-level 2-year programmes or even longer. As potential students in LLL programmes may be active professional foresters with highly specialized needs, but also professionals or students from other fields of knowledge willing to learn about natural resources management, forestry LLL faces its own challenges in the generalist versus specialist spectrum. We analyse here this spectrum of opportunities across universities and forestry organizations in Spain.

Key words: Lifelong learning, forestry, Spain.

Introduction

Spain passed Order CIN/324/2009, 9th February (published BOE nº43, 19th February 2009) to specify competences for Technical Forest Engineers, as a regulated profession linked to official study programmes approved and accredited by the Ministry of Science and Innovation. The adoption of a 4-year Bachelor programme thereafter was implemented in a very similar fashion in the 16 Universities offering forestry studies (Vega-Garcia and Alcázar, 2014; García Robredo, 2013), providing a general background with little opportunities for specialization, relegated to the 4th year (e.g. 24 ECTS credits in the University of Lleida).

Forest Engineering at the Master level was also specified as a regulated profession in Order CIN/326/2009, 9th February (published BOE nº43, 19th February 2009). The programmes developed had to compete with other, non-regulated programmes providing a wide range of specialization at the MSc level, and faced an unprecedented raise in tuition in Spain (which almost tripled), which has led to very low rates of enrolment.

MSc programmes are designed for duration over at least a few years, as these programmes are usually linked to permanent faculty positions in HEIs, and require

accreditation by the Ministry of Education in Spain, a relatively lengthy process. They require a student to acquire between 60 and 120 ECTS credits (1-2 years) which makes these programmes expensive and not always flexible options for further education.

In the current economic crisis in Spain, many individuals turning to education and training for a career have shifted their focus towards Lifelong Learning (LLL) opportunities (Barabasch *et al*., 2015).

LLL has turned to have a growing influence in recent years on education policies in national governments, international agencies and institutions of learning in almost all countries (Regmi, 2015). LLL can be broadly defined as learning that is pursued throughout a lifetime. It includes not only formal education at school, college, university, etc. but also learning in whatever context that provide opportunities to further the knowledge and develop the skills needed throughout life for personal and professional development.

Accreditation of LLL programmes in Spain is more dynamic in nature than formal education. It depends only on the university senate's approval if given at that university, may involve non-university instructors or professional organizations, and can be structured in levels ranging in duration from one-day seminars (0.5 ECTS credits) to Master-level 2-year programmes (120 ECTS credits) or even longer (non-accredited BSc).

The potential students in LLL may be active professional foresters with highly specialized needs (e.g. strategic fire-fighting skills), but also professionals or students from other fields of knowledge willing to learn about natural resources management (e.g. general conservation issues), or the general public. Therefore, forestry LLL faces its own challenges in the generalist versus specialist spectrum.

Our intent was to analyse this spectrum of opportunities across forestry programmes at universities or professional associations in Spain and the demands for professional further education (LLL) with a view to inform the TEMPUS project SUSFOR-Vocational training in Sustainable Forestry (2014-2017). SUSFOR aims to create a system of LLL in sustainable forestry at universities in Russia and Moldova, improving teaching capacity for LLL, and developing a LLL-oriented sustainable forestry modular curriculum in collaboration with Austrian, Finnish and Spanish partners.

Data on courses being offered either by universities or by professional associations were compiled for the period 2007-2015 by accessing web pages and requesting information through mail. All the courses collected were examined and classified according to content and workload recorded. An advance on general findings is presented below. As it is an ongoing analysis, here we aim only to succinctly describe how opportunities for LLL in Spain in the Forestry field are organized, for whom, by

whom, and what the most demanded topics are in recent years. In providing this summary of topics (and their recent trends), our focus is mainly descriptive, but allows comparison with trends in other countries, and suggests that universities in Spain are lagging behind and losing presence in this educational field.

A summary of topics and trends in LLL Forestry in Spain

- Results of data collection indicate that LLL on forestry topics of interest to the general public or professionals or students from other fields of knowledge is sometimes provided at universities (e.g. "Wildlife photography"; "Specialist degree in wildlife tourism: tourism, birding and photography" by the University of Lleida, 2015), but in a very limited fashion.
- Specialized professional courses are conducted by universities ("Spatial analysis tools applied to research and forest management, SADIE"; "R -The R Project for Statistical Computing- applications for data analysis in forest ecosystems" by the University of Cordoba, 2015), but also by professional associations, occasionally in partnerships that used to be with universities but are moving to technological companies.
- In line with an increasing demand, there are already universities creating spin-offs for the sole purpose of developing LLL programmes and professional training (i.e. University of Valladolid: föra forest technologies, University of Cordoba: e-Learning forest). Courses are mainly conducted online, and approach topics of high technical content ("Innovation in carbon footprint accounting"; "Lidar-based forest inventory").
- The professional associations very actively and attractively announce and disseminate their study programmes (Colegio y Asociación de Ingenieros de Montes: 50 courses/year, PROFOR: 8 courses/year). However, they still advertise their courses in hours, not ECTS credits. In their courses dissemination, the main professional association in Spain (Colegio y Asociación de Ingenieros de Montes) estimates 5-7 years of half-life of technical knowledge in Forestry (http://www.ingenierosdemontes.org/formacion/). They assume that already 10 years after getting a degree, professional competence may be reduced by half, and with the rapid advances in technology this time span may be even shorter. Their courses have shifted from traditional formats to online formats, 36% in 2008 to 91% in 2015. Some topics are relatively stable over time, but emerging topics can also be identified (Table 1).

Analysis of the collected course data in Table 1 suggests new topics are coming up; we find contents related to traditional skills in hunting, wildfire management, fungi identification and production, ecotourism but they are often linked to geotechnologies (Remote Sensing & GIS), software applications, internet marketing, social networks and apps. Natural hazards and geotechnologies are gaining importance, as urban forestry and landscaping and business administration.
Energy (solar, biomass, bioclimate in buildings) was prevalent in the courses offered by the main Association of Forest Engineers in Spain for 2015.

Table 1. Evolution of training topics offered and duration by Asociación y Colegio de Montes in Spain, 2007-2015.

MAIN TOPIC	07	08	09	10	11	12	13	14	15	HOURS
GIS, AutoCAD	1	2	4	5	7	9	11	8	5	50-200
Landscape & Urban Architecture	-	1	-	1	2	2	4	5	5	50-60
Water Resources & Management	2	2	3	2	-	1	3	2	2	20-150
Wildfires & Hazards	2	2	1	3	6	6	7	4	5	10-75
Land Planning	1	1	1	-	-	2	1	1	1	30-50
Forest Economics, Valuation	-	-	-	-	-	1	2	2	1	50
Environmental Management & Project Development.	9	8	11	12	13	17	14	7	3	16-200
Legislation & Law	1	1	-	-	1	1	2	1	1	13-40-200
Business Administration	1	1	1	1	1	8	3	4	6	8-150
Wildlife Management	1	-	-	1	2	3	5	4	4	24-150
Climate Change, Carbon footprint	1	-	1	1	-	-	-	3	1	15-150
Energies from renewable resources	-	1	-	1	-	-	8	11	9	4-800 (Master)
Sustainable Tourism and Development	-	2	-	1	-	-	1	1	1	20-100
Forest management & Conservation	-	2	-	-	-	2	1	2	-	100-150
TOTAL COURSES	19	23	22	28	32	52	62	55	44	

- The engineering component of the profession of foresters is strong in Spain, and raises interest for training in environmental management and project development: construction, planning, health and safety regulations, wood structures, roads, and also water resources and hydro-engineering.
- Most courses offered have a variation of instruction length between 20 and 200 hours, and tuition (around 30 €/10 h) is competitive when compared to MSc programmes.
- There is a wide range of LLL opportunities in Forestry, Forest Engineering and Natural Resource Management for graduates, other educational categories, and the general public in Spain. However, it is unclear whether universities will be leading LLL in the future. As new technological topics emerge, LLL is creating new markets for professional qualification and training increasingly linked to technological companies that provide these services. Online learning is prevalent, and use of ICT is expected to increase.
- Practically the totality of adult education found in universities, associations and technology companies can be described as serving economic needs, or related to an utilitarian and productionist viewpoint of LLL (EUCIS-LLL, 2014). LLL in Forestry in Spain seems to follow a "human capital" model, not a more integrated "humanistic model" (EUCIS-LLL, 2014; Regmi, 2015). Transversal competences (social, intercultural and civic) seem to be missing in these institutions and there seems to be a gap with the wide range of other training companies offering training on more general competences or "soft skills" such

as human resources management, decision making, international commerce, social responsibility, or conflict resolution.

- Investing in human capital is a top priority in the EU agenda (EUCIS-LLL, 2014) under paradigms of competition and information (Sahlberg, 2009). Forestry LLL in Spain conforms to this goal. However, the current frame of transmission of information in a mechanistic fashion should evolve to include creativity and innovation paradigms and transversal skills, if the aim is to truly contribute to a sustainable knowledge society in Spain.

In conclusion, in Spain there is a very wide and varied growing range of specialization courses for adults that primarily reflects the incorporation of new technologies in the forestry sector and targets professionals with advanced qualifications, under a human-capital model. LLL programmes are increasingly linked to companies and professional associations, rather than to universities, which raises doubts on the part universities will play in the future of LLL in Forestry. The generalist part of the spectrum, targeting the general public or professionals or students from other fields of knowledge is clearly underdeveloped, and does not contribute to a better knowledge of forestry in our society.

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IMPLEMENTING LIFELONG LEARNING AT SAINT PETERSBURG STATE FOREST TECHNICAL UNIVERSITY

ALEXANDER ALEXEEV, MAXIM CHUBINSKY, OLGA SHAYTAROVA

Abstract

Development of a modern system of continuous education is one of the main aims of the state education policy in Russia. This aim is recorded in the draft "Priorities for the development of the education system in the Russian Federation", developed by the Ministry of Education and Science. Despite the fact that the term “Lifelong Learning” is new in the Russian educational system, principles of Lifelong Learning are widely implemented in the educational system, in particular in the Saint-Petersburg State Forest Technical University. This study focuses on the different ways of implementation of lifelong learning.

Key words: Higher education, Bologna process, Lifelong Learning, Russia

Introduction

The development of a system of continuous education is an important priority of the European and the Russian educational policy. It is aimed at human development by improving access to education and creating opportunities for all members of society to lead a long, fulfilling, creative and intellectual life. Developers and agents of the policy of continuous education in the international arena are the Council of Europe, European Commission, UNESCO, the Organization for Economic Cooperation and Development (OECD) and other international institutions. The universities are executing the concept at the institutional level which, as the «vanguard of socio-economic changes» and the locomotive of the changes in the education systems of the world as a whole, carry a social responsibility for creating models and strategies for continuing education.

Ensuring equal access to higher education, necessary for the implementation of a policy of continuous education, requires a fundamental change in the methods of educational services by universities. These include the development of new educational programmes and innovative learning technologies, the introduction of new forms of certification, the application of new ways of financing, changes in the rules of admission to universities, the introduction of incentives and additional services for students and provision of legal measures to reduce discrimination and the support of the target groups. It is clear that effective implementation of such a set of diverse innovations at the level of individual national educational institutions is

difficult without enhanced international partnerships and without global involvement of an interested target audience. This means that one of the key factors in the development of the paradigm of continuous education will be international collaboration between universities.

On September 1st 2010 all Russian universities changed to a two-level system of education: Bachelor/Master. Also in 2010, the leading Russian universities developed the Federal State Educational Standards. These standards take into account the principles of the Bologna Declaration, including the competence-based approach of higher education, increased academic freedom of universities for curriculum development, the chance for the students to choose courses in the educational programme, an increasing role of self-study, using credits for scoring the workload of the courses and on curriculum level.

In December 2007, at the Sorbonne, another joint programme document was adopted – the Charter of European Universities on Lifelong Learning. Organizer of the project was the European University Association (EUA) with support of several international organizations such as the European Network of University Continuing Education (EUCEN), the European Association of Adult Education (EAEA), the European Association of Distance Teaching Universities (EADTU), the European Students Union (ESU), the European Association of Institutions in Higher Education (EURASHE), Education International (EI), and the European Network of Access to Higher Education (EAN). This cooperation indicates the high importance of the policy of continuous education in Europe and globally.

The socio-economic development in the world today is determined by the educational opportunities for human development through continuing education. The availability and success of the strategy of continuing education (learning throughout life) – from pre-school to adult education – largely depends on further economic development, the humanization of social relations, rooting of democratic values and social cohesion at regional, national and global levels.

New directions of educational policy based on the concept of continuous education are developed in the world to facilitate the transition to society of knowledge, equal opportunities, and open access to education for all citizens. The aim is to establish conditions that encourage and motivate citizens to learn how to use formal education as well as non-formal and informal opportunities for their further educational development.

Implementing of LLL in Russia: the example of St. Petersburg State Forest Technical University

For Russia, the development of a modern system of continuous education is one of the main directions of state education policy. This is mentioned in the "Priorities for the development of the education system in the Russian Federation" (Anonymous,

2005), developed by the Ministry of Education and Science. The development of the system of continuous education in Russia involves ensuring institutional opportunities for Russian citizens to build individual competence profiles and acquire lifelong professional qualifications required for the individual for personal development and competitiveness in today's labour market. As well as the need to develop a system of LLL in Russia at the national level, the special role of institutions of higher education (universities) in the process is also recognized.

The idea of LLL came as a response to the dynamic changes in science and industry. Based on the analysis of the social role of LLL in human life, Russian researchers define education as a factor of social development (Kritskaya and Kritskaya, 2010); as a basis for activities; as a condition for the enrichment of the spiritual life; as a condition for development of self-awareness and mental development as well as contributing to communication through language competence – the expansion of the circle of communication.

Development of the system of continuous education is one of the most important directions of innovative educational activities, suggesting a continuous process in primary, secondary, tertiary, postgraduate and additional professional education. The efficiency and the possibility of educational activities are determined by the system including forward and backward linkages between the various stages of the innovation cycle, producers and consumers of services, firms, markets, government and other social partners, including foreign ones. Continuing education can be considered as part of the formal structure of the so-called "learning throughout life" and is one of the important conditions of innovative educational activities.

Development of the system of LLL is aimed at supporting the competencies of the individual, based on the implementation of the concept of developmental education. The concept of LLL based on the principles of continuity, flexibility and dynamics associated with changing needs in the labour market, on the implementation of the concept of education "not for life, but in life." Modern man must not only have a certain amount of knowledge, but also be able to learn: to seek and find the information needed to solve any problem using a variety of sources of information, constantly acquiring broader competencies.

In spite of the fact that the term “Lifelong Learning” is comparatively new in the Russian educational system, Lifelong Learning principles are widely implemented in educational space, in particular by Saint-Petersburg State Forest Technical University (FTU). The system of advanced professional studies and extended training of specialists have been working in FTU since 1858, when first special forestry courses were organized

Nowadays FTU has a Multi-sectoral Institute of Continuous Education. The institute offers several forms of education: preparatory courses, special training classes and extended professional oriented training. The programmes of professional orientation

are aimed to provide the forest sector of Russia with personnel. The institute organizes:

- Advanced professional studies for specialists;
- Professional extended training for those who have graduated in different disciplines of higher education and work in forestry and forest based industry.

The preparatory department of the institute provides school, lyceum and college graduates with more detailed information concerning FTU departments and educational programmes, acquaints with different specialties and offers training on mathematics, Russian language, physics, economics, biology, geography and social sciences:

- Training of applicants for entrance examination in evening courses;
- Profile classes for school children;
- Weekend groups and supplementary courses for students;
- Consultations, universal state examination training.

One of the FTU faculties is a Faculty of Secondary Education, which includes the College of Timber Industry Automatization. This college offers professional education in the area of wood processing technology. Its graduates can continue their education elsewhere at University.

The University has its own botanical garden with the richest collection of trees, shrubs and herbage at 60-th parallel North – with more than 1500 species. It also has unique museums: the Museum of Forest Entomology and the Museum of Forest Zoology and Hunting. These museums and the garden are opened for excursions of school children and kindergarten groups, during which young visitors learn about forestry, forest research and education.

The university has a Congress Department and an International Centre of Forestry and Forest Industry, which regularly organize seminars, workshops, practical and scientific conferences, trainings and summer schools on current questions of forestry and forest industry development. Russian and foreign scientists, industrials, university staff and students take part in these events.

During the period September to December 2015 more than 100 representatives of FTU academic staff graduated from the continuing education courses on “Contemporary educational technologies”. The University has a successful experience in international educational projects development. There are several projects devoted to Lifelong Learning in which FTU took part:

- Continued Education in Economics (PCP3/FIN-10-R), 1998-1999;
- North West Forest Trainer project (IB_JEP-23107-2002), 2002-2005;
- Developing a MSc Curriculum in Forest Policy and Economics “FORPEC” (CD_JEP-27061-2006 (RU)), 2007-2010;
- “Qualifications framework for sustainable forestry and lifelong learning - SUFAREL” TEMPUS-JPHES-№ 516796, 2011-2014

Nowadays FTU is a partner in TEMPUS project 543946 TEMPUS-1-2013-1-ES-TEMPUS-JPHES "SUSFOR – Vocational training in sustainable forestry: a lifelong learning approach" (time frame 2013 to 2016). SUSFOR project supports the creation of Lifelong Learning system in the field of sustainable forest management in the universities of Russia and Moldova. Project objectives are:

- Improvement of teaching capacities in the universities of Russia and Moldova for purposes of Lifelong Learning;
- Development of training programmes in the field of sustainable forestry-based modular curricula in the system of LLL-training.

Professional studies as an important part of lifelong learning

As it was mentioned above the Russian Federation since 2010 moved to a multi-level system of training in high education (Figure 1).

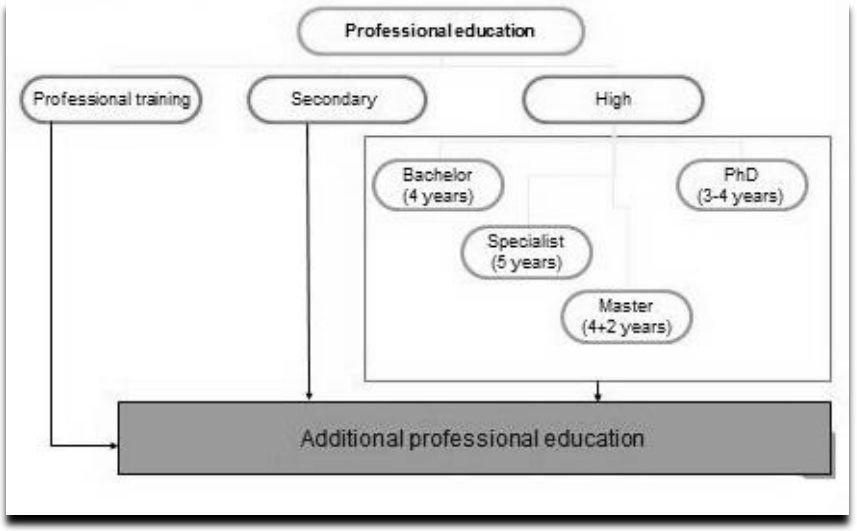

Figure 1: Framework of professional education types Source: Kritskaya and Kritskaya (2010).

The system includes initial professional training, secondary (medium level) at which technicians are graduated, and high school level: Bachelor, Master and doctoral levels. An important part of professional training is additional professional education. The types of additional study programmes are presented in Figure 2.

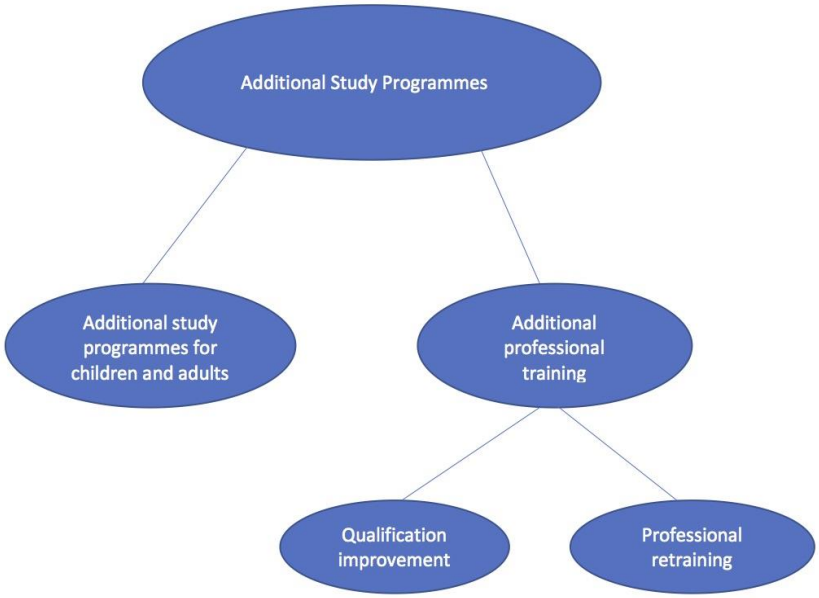

Figure 2: Additional study programmes types Source: Anonymous, no year.

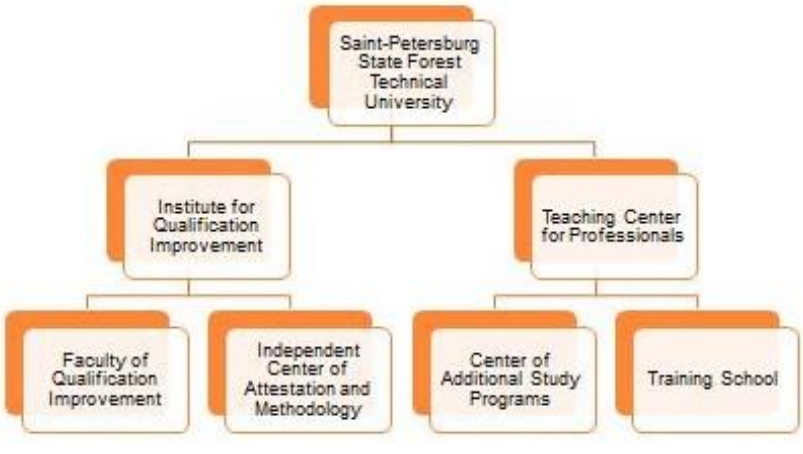

Figure 3: Organizational structure of additional studies in Saint-Petersburg State Forest Technical University.

An additional study programme is divided in a professional one and a general one. Professional additional training is usually realized in two forms, first is qualification improvement of specialists having already finished higher education, and, second, professional retraining offering the student to obtain a degree in specialty from their original one. The organizational structure of the additional studies in Saint-Petersburg State Forest Technical University is presented in Figure 3.

Two units of FTU provide additional studies, the Institute for Qualification Improvement, and the Teaching Centre for Professionals. The total number of qualification improvement programmes is 28, of which 17 are forestry and landscape architecture related, the rest is related to forest industry and other fields of expertise. The total number of professional retraining programmes is 10, of which 4 are forestry related. The total number of companies which enrolled its employees in additional study programmes is 60, of which 11 are state affiliated or owned.

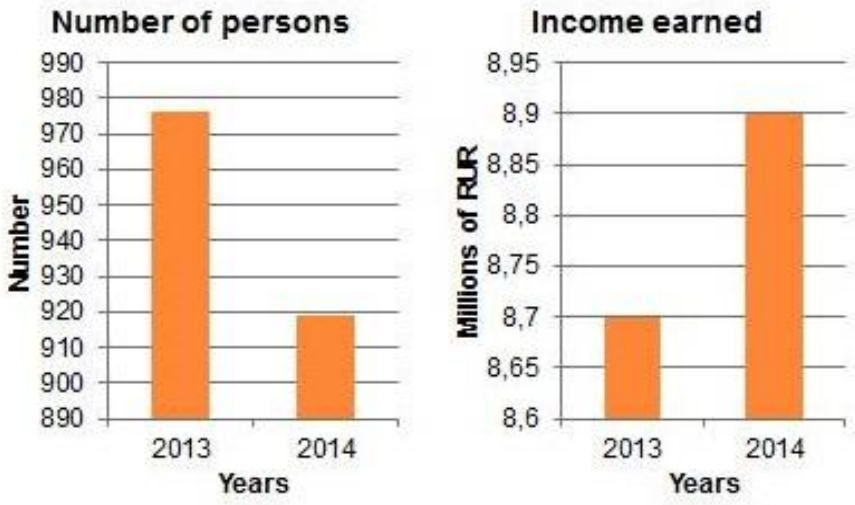

Figure 4. The number of persons enrolled and total fees (income earned) in RUR in 2013 and 2014.

Table 1: Continuing education programme titles, numbers of teaching hours and educated persons 2015.

N°	Programmes	Hours	Persons
1	Forest protection for engineers in forest pathology	72	10
2	Basics of silviculture	40	2
3	Labour protection in forest industry	16	2
4	Hunting management and control	16	15
5	Basics of furniture production	36	8
6	Technology of plywood production	40	16
7	Technology of wood drying in cameras	40	19
8	Diagnostics of forest and decorate trees seedlings quality	40	14
9	Ecological safety and work with dangerous wastes (4 programmes)	72	411
	Total	208	497

The decline in number of enrolled persons is accompanied by a raise of fees to be paid (Figure 4). The explanation of this picture is very simple: a small decline of about 5% of participants in additional training was more than compensated by the raise of course fees due to inflation. Information on programmes of qualification improvement and programmes of professional retraining in the first half of the year 2015 are presented in Tables 1 and 2.

Table 2: Professional retraining: programme titles, numbers of teaching hours and educated persons 2015.

N°	Programmes	Hours	Persons
1	Safety of human activity in technosphera	502	5
2	Woodworking technology	508	11
3	Landscape architecture, parks and gardens	506	7
4	Environmental protection and rational use of natural resources	502	1
5	Interpreter in professional communication	1500	8
	Total		32

The number of persons in qualification improvement programmes were 497 in 9 programmes and in professional retraining programmes 32 in 5 programmes (Tables 1 and 2). The total number of educated persons were 529 in 14 programmes which is a bit more than in the years 2013 and 2014, if in the rest of the year 2015 the result will be the same. Total income in 2015 was 5 909 149.00 RUR or 92330.50 EUR (64 RUR/EUR), also more than the first halves of the previous years.

Conclusion

Higher education in Russia is ready to implement a LLL education system following the changes in the world and in Russia. The transitions to the Bologna principles have given new impulses of development. Supporters believe that a positive change of the inadequate pace of reform is coming, and their views are supported by the new educational standards. But many reforms are still needed in the educational system and education standards.

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THE CHALLENGES OF ENGLISH-MEDIUM INSTRUCTION: WHAT CAN BE LEARNT FROM THE EXPERIENCES OF STUDENTS AND LECTURERS AT THE UNIVERSITY OF FREIBURG?

SUSANNE GUNDERMANN

Abstract
English-medium instruction (EMI) has become increasingly popular in higher education, specifically in forest and environmental sciences. This paper sheds light on the challenges of English-medium instruction for students and discusses practical recommendations for quality improvement in EMI programmes. Empirical findings from two years of ethnographic fieldwork in an English-taught Master's programme at the University of Freiburg indicate that the use of English as a lingua franca in the classroom is neither the only nor the most difficult challenge for students and lecturers. The pluridiversity of the international student body and the local academic culture have far more influence on the learning environment than most people would expect. The resulting implications for EMI practice are that lecturers need to recognize and acknowledge the impact of pluridiversity and of the academic linguacultural habitat on the international EMI classroom. Furthermore, it is crucial that lecturers accommodate their teaching style to the specific EMI conditions instead of merely fostering (or being apprehensive of) their English language proficiency and linguistic performance in the English-taught classroom.

Key words: English-medium instruction, Master programme, pluridiversity, learning culture, no knowledge of local language and context

Introduction

In line with the ongoing internationalisation of academia, learning and teaching in English, so-called English-medium instruction (hereafter: EMI), has become increasingly popular in higher education. The number of English-taught degree programmes has risen tremendously over the past decade, with Germany being the second most influential provider of English-medium instruction in Europe, only surpassed by the Netherlands (Wächter and Maiworm, 2014). This trend of switching from instruction in the local native language to instruction in English is particularly vital in engineering and natural sciences; however, it is also becoming more and more important in life sciences, environmental sciences, and in forest sciences.

It lies in the nature of EMI that – at least in non-English speaking countries – the majority of stakeholders involved are non-native speakers of English from a variety of linguistic, cultural and academic backgrounds. In other words, English serves as a

classroom lingua franca among speakers of different languages who would otherwise barely be able to communicate with each other. In contrast to other pedagogic approaches such as CLIL (*content and language integrated learning*), EMI does not encompass language learning, thus English language courses are not part of the curriculum in EMI programmes. When applying for EMI programmes, students usually have to prove an adequate language proficiency level in order to get admission. This is often done through standardized (and commercial) English language tests such as TOEFL (*Test of English as a Foreign Language*) or IELTS (*International English Language Testing System*). In contrast, teaching staff in EMI programmes are, for the most part, domestic lecturers who had been asked to fulfil (some of) their teaching duties in English, but had never been assessed on their language proficiency.

These preconditions inevitably lead to question whether and how EMI successfully works. Even if we take the advanced language proficiency levels of the students and lecturers for granted, we can safely assume that lingua franca interaction in the EMI classroom bears some challenges. Thus the initial question is how the use of English as a classroom lingua franca among students and lecturers actually works and which linguistic challenges it brings about for the learning process. The accompanying question to this is whether the EMI context raises challenges that go beyond English language use and which these are. In addition and as a consequence, we need to find out which immediate and long-term strategies can help to improve the quality of learning and teaching in EMI programmes. The following sections seek to answer these questions based on insights from a case study of an EMI programme at a German university.

Case study of an EMI programme at the University of Freiburg

In order to answer the aforementioned questions, the author carried out a case study of an English-taught Master's programme at the University of Freiburg (Gundermann, 2014). Ethnographic fieldwork followed a grounded theory approach (Glaser and Strauss, 1967) and extended over a period of almost two years. Methods for data collection included quantitative as well as qualitative methods, comprising participatory observation, semi-structured interviews, questionnaires, audio recordings of classroom interaction, listening experiments and a collection of emails and other extant texts available to the researcher[4].

The University of Freiburg (Germany) currently offers sixteen English-taught degree programmes, three of which are hosted by the Faculty of Environment and Natural Resources, formerly known as the Faculty of Forestry. One of these programmes has been selected as the case to be investigated: The Master of Science in Renewable Energy Management (hereafter: REM). The REM programme represents a

[4] Research participants had been informed a-priori about the data gathering process and gave their consent to use the data for research purposes. For detailed information on the amount and characteristics of the data sets see Gundermann, 2014.

prototypical EMI programme in that it is entirely taught in English and designed as an international programme, i.e. there is a restricted quota for domestic students while the majority are international students coming from virtually all over the world. In addition, REM is an interdisciplinary Master's programme which means that students from a range of disciplines and academic backgrounds can apply (e.g. mechanical engineering, electrical engineering, chemistry, forestry, energy economics, geography, …).

Fieldwork in REM started when the programme was launched in 2008. At that time, REM teaching staff with regular teaching duties comprised 27 lecturers[5], almost all of whom were German academics with German as their first language. Outside the EMI classroom, they used German far more frequently than English because the University of Freiburg is largely monolingual when it comes to internal communication (meetings, emails, contracts, etc.).

The first cohort of REM students comprised 26 students, the second cohort 38 students. Both cohorts were pluridiverse in the sense that they differed on various levels: Students had 19 (21)[6] different Bachelor degrees, came from 15 (21) different countries and spoke 17 (17) different first languages. Figure 1 illustrates the students' linguistic diversity.

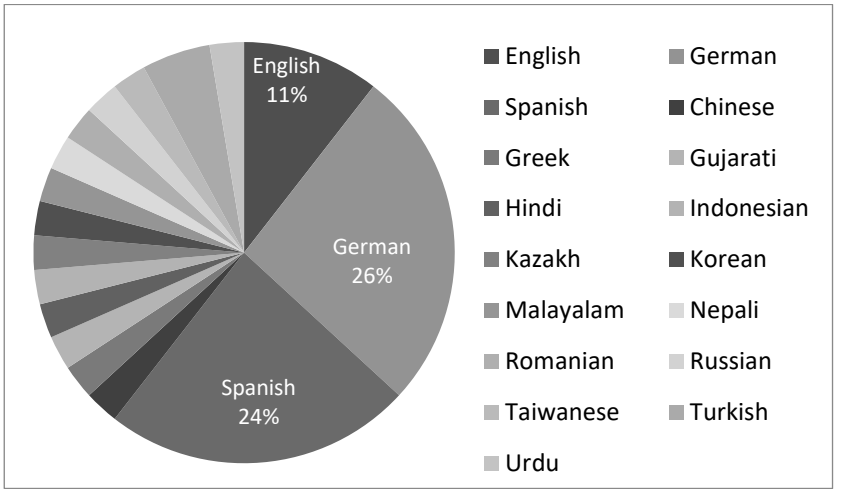

Figure 1: Students' first languages in the REM classroom (2nd cohort, n=38).

In other words: the student body was highly heterogeneous and characterized by pluridiversity. English was the only language available for communication by all participants. A fair number of students did not have sufficient or any knowledge of the surrounding local language (German), the use of English as a lingua franca was thus inevitable.

[5] Guest lecturers and doctoral students serving as teaching assistants are excluded here.
[6] Figures in parentheses refer to the second cohort of REM students.

English as a classroom lingua franca

The REM case study showed that lecturers occasionally had difficulties in their use of English which challenged students' comprehension of their lessons. The most common linguistic challenges for students arose when lecturers unintentionally used erroneous vocabulary or when they spoke with an accent heavily influenced by their first language German.

Non-standard lexical idiosyncrasies were rare and did not severely inhibit comprehension, e.g. **repeatance* instead of *repetition*. What really caused confusion and ultimately even miscomprehension was the use of so-called false friends, i.e. words that look like an equivalent in the native language, but have a different meaning. For example, *to isolate* and German *isolieren* look very similar, but can have different meanings (*to separate* vs. *to insulate*). Thus, false friends as in examples (1) and (2) can lead to confusion in the EMI classroom.

(1) *rentability

(2) *"Your internship* must not *be in Germany."*

In (1), the lecturer wanted to refer to *profitability* (in German: *Rentabilität*). The lecturer in example (2) actually wanted to point out that students did not need (*müssen nicht*) to do their obligatory internship in Germany, but they were of course welcome to do so. However, the use of the false friend modal *must not* implies the opposite.

Non-standard accents with noticeable first language influence can be found across the student body as well as the teaching body. Such non-standard pronunciations can occasionally lead to confusion in the initial phase of an EMI programme when its participants are not yet familiar with everyone's different ways of speaking. A stereotypical feature of a German accent in English is the notorious replacement of the TH sounds /ð, θ/ with S sounds /s, z/. An Indian student, unfamiliar with this common German accent feature, reported to have been confused because he understood that his lecturer was talking about NASA (*National Aeronautics and Space Administration*) – although the lecturer in fact only wanted to refer to a further example (*another*) (3).

(3) **a NASA example from the Black Forest?*

Yet, frequent interaction with each other soon leads to familiarization with non-standard accent features and levels out potential future misunderstandings.

REM students and lecturers applied a variety of strategies to circumvent miscomprehension in the EMI classroom. These strategies included anticipatory apologies (e.g. "I am sorry when some words are missing."), explicit requests for translation help when lexical gaps occurred, seeking approval from native speaker

students or – unfortunately – avoidance of interaction with speakers with particularly strong non-standard accents. Severe misunderstanding therefore rarely occurred in the REM classroom and if they occurred, they were rarely caused by linguistic differences between sender and receiver.

English-medium instruction: The challenges beyond English

Besides linguistic challenges, the REM case study also revealed three core challenges in EMI programmes which are often overlooked by lecturers: students' different degrees of (un)familiarity with the local language, with the local learning culture and academic habits, and lastly, with the local linguacultural context.

Familiarity with or even fluency in the surrounding local language cannot be taken for granted in EMI programmes, unless it is an explicit admission requirement. The REM programme is advertised as 100% English on its webpage (4). Thus, one could assume that the local language German does not play any role there. However, apparently the opposite is the case.

> (*4) Do I need German language skills for the MSc REM?* No, the course is held completely in English. For your life in Germany it is advisable to speak a little German. *(FAQ, REM webpage)*

German is the dominant language of the REM environment. For example, field trips and excursions are frequently accompanied or even guided by German-speaking experts from the field. On a field trip deep into the Black Forest, the operation of a wood chipper was demonstrated by a local forester. The lecturer who led this field trip did his best to provide an ad-hoc translation of the forester's explanations, but essentially shortened them to only a few sentences – much to the non-German speaking students' disappointment.

A further example of the relevance of German in the REM programme relates to the obligatory internship as part of the curriculum. Theoretically students can seek an internship placement anywhere in the world, but due to financial constraints and visa regulations, many students prefer to do their internship in Germany. Yet, without being fluent in German, it is very difficult to find an internship placement in Germany and this put the majority of the REM students at a disadvantage. While all REM students had at least advanced English language skills, roughly one third of each cohort (31% and 41% respectively) did not have sufficient or any German language skills.

Yet, German language knowledge is not just beneficial for understanding local experts and finding an internship placement, it is also valuable for the learning process inside the EMI classroom. For example, lecturers typically provide reading lists for their students, but not all lecturers always make the effort to only include

sources in English[7]. Furthermore, students often have to work on real-life tasks that require background reading. If the task is situated in a local (German) context, students are likely to only find information in German which can lead to a lot of frustration for non-German speaking students (5).

(5) "Some of our projects are focused on Germany, so the information source is in German which is … it kind of hinders how much you can contribute and then you always have to do it through a German speaker […]. I think if you come for the programme but you're restricted in some of the things that you need to complete the programme, it's a bit irritating and frustrating." (Canadian student)

The second core challenge of EMI consists in different degrees of familiarity with the local learning culture and academic habitat. In section 2, we have seen that the student body in REM was highly heterogeneous with regard to their linguistic, cultural and academic backgrounds and we can thus take it for granted that students' learning experiences are equally diverse. These differences can potentially lead to a lot of misunderstandings in the beginning.

Many students, particularly those from Asian cultures, are not used to addressing lecturers directly during class and asking questions (6). This can lead to a distorted view on the learning progress in the classroom if lecturers interpret the fact that students do not ask any questions as satisfactory content comprehension.

(6) "I think there is a large grey area where students do not understand things but do not dare to ask for clarification because they do not want to show the professor up in any way. And they do not want to show their classmates that they have not understood a certain word or context." (German professor)[8]

What is more, German lecturers expect a lot of autonomy from their students as self-directed learning is an integral part of the German learning culture (7). Students who are used to having more guidance can easily be overwhelmed if they are not used to organizing and self-monitoring their learning progress (8).

(7) "You are not given everything you need but you have to find it yourself." (American student)

(8) "To handle this extent of freedom is actually a very hard task." (Russian student)

Unfamiliarity with the local learning culture can become a real issue for students when it comes to assessment. Memorizing facts and eliciting them in examination

[7] Probably due to time constraints, REM lecturers occasionally did not search for references and text books in English, but included German titles which they just copied from reading lists from their German-taught courses.

[8] Original quote in German, translated by the author.

(often referred to as *rote learning or bulimic learning*) is generally considered insufficient at German universities. Instead, students should demonstrate their understanding by transferring the newly acquired knowledge to other contexts/tasks and by critically evaluating it. However, more often than not, lecturers do not explicitly mention this general expectation but simply take it for granted that students know what (not) to do – a fact which can lead to confusion (9).

> *(9) "[T]he culture, learning culture is completely different […]. Sometimes professors gave example questions that can be on exam. And how I learned so far was: If teacher says this will be on exam, it was always. So I really studied these ones so hard. And then on the exam I found none of those questions are really there! So I felt like they lied to me and why are they making it more confusing?" (Korean student)*

The third – and most frequently overlooked – challenge in the EMI classroom has to do with varying degrees of familiarity with the local context and habitat. In order to specify their explanations, many lecturers include examples and anecdotes in their lessons. However, time and again these refer to situations or contexts that require knowledge of Germany, be it sociocultural, political, historical, geographical or other. International students, who represent the target group of EMI programmes, usually do not yet have this knowledge and thus sometimes cannot make sense of their lecturers' examples (10).

> *(10) "Sometimes I don't understand what we are speaking about when they [=the lecturers] are saying 'You know where, you know where is walawalawalawala' [=onomatopoetic for incomprehensible place name]. There was some story […] and maybe Germans know what was happening in this story, maybe, but we don't know. Sometimes they explain it, but sometimes not." (Kyrgyz student)*

Besides geographical denominations, problematic references to the local German context for example also include mentions of political concepts. These often translate easily into English (e.g. *Energiewende* literally translates into *energy transition*) but entail a locally specific meaning: energy transition in this context does not refer to a physical process but to energy policy. If lecturers do not contextualize such concepts, e.g. by explicitly stating that they are using a universal term but with a locally specific meaning, students are likely to be misled which eventually hinders their learning progress.

Recommendations from EMI students

In the framework of the REM case study, students were asked for their suggestions for lecturers in order to improve the quality of learning and teaching in REM and other EMI programmes. The REM students came up with various ideas and suggestions, both for improvement through institutional measures and through individual steps.

At the institutional level, students advise EMI programme boards to integrate training in the local language into EMI curricula[9]. This does not necessarily mean that language courses need to be awarded with ECTS points as part of the Master's curriculum, but at least a beginner's German language course should be aligned with the schedule so that all students have a chance to attend. In addition to integrated German language training, the REM students also pointed out the benefit of intercultural training prior to starting the programme. Such training should introduce students to the specificities of the local learning culture and academic habits.

Institutional measures for lecturers should first and foremost include didactic training. Many students emphasized that difficulties in understanding their lecturers were usually not caused by their English but rather by their limited didactic adjustment to the special situation of teaching through a foreign language. EMI training practice at the University of Freiburg[10] has shown that apart from general didactic principles and interactive teaching methods such training needs to foreground communicative skills specific to the EMI classroom. These skills for example include response cues if lecturers do not understand student contributions or discourse management skills to facilitate classroom discussions.

In addition to didactic training, the REM students also suggested that all teaching staff in EMI programmes be assessed on their language skills prior to teaching in English. This suggestion was not only brought up by students, the REM lecturers also stated that language assessment for lecturers should be institutionalized instead of simply taking appropriate language skills for teaching for granted without asking for any proof (11).

> *(11) "I actually found it a bit negligent to appoint someone [to teach in English] without asking for any language certificate, just trusting that they would somehow do it well enough." (German lecturer)*

Aside from recommendations at institutional level, the REM students also formulated five suggestions which can immediately be put into practice by the individual in order to enhance comprehension and the quality of learning in an EMI classroom (Box 1).

[9] Nota bene: the REM students expressed that they wanted GERMAN language training. English language training for students was deemed unnecessary because everyone already had to prove a rather high level of English for admission (language entry level: IELTS band 7.0 or TOEFL ibT 100 pts).
[10] For further information on EMI training at the University of Freiburg, visit the EMI project website at http://www.sli.uni-freiburg.de/emi.

#1 Try to keep it simple!
#2 Provide learning and teaching materials in advance!
#3 Precise your assessment conditions and expectations!
#4 Provide opportunities for informal interaction and building rapport!
#5 **DO** interact with your students!

Box 1: Students' recommendations for lecturers to immediately improve learning and teaching in English-medium instruction programmes

The suggestion to keep it simple (#1) means that lecturers should try to vary their register in English instead of only using discipline-specific jargon and syntactic constructions which are more typical of academic articles than of spoken language (12-13).

(12) "The best would be to have a clear English or clear language in your slides. Clear language in your speech. Try to keep it simple." (Indian student)

(13) "One should tell them in any case that it is not about building difficult sentences, because I think this can very often go wrong because, if you use something not hundred percent in the way how you want to, then this may be misunderstood by someone. (German student)

Suggestion #2 is crucial for students with limited English language skills because this way they can better prepare for their classes and look up unknown terminology in their native languages in advance.

Suggestion #3 is particularly important for international students who might not be acquainted with culture-specific assessment formats (e.g. oral report) or expectations (e.g. no appreciation of rote learning).

Suggestion #4 relates to the fact that mutual comprehension in an international EMI classroom requires familiarization with different accents of English and adaptation to new communication styles (e.g. expressing critical views in class without fear of criticising the lecturer). The more opportunities students have to get to know their lecturers and peers beyond actual lectures and lessons, the quicker they can adapt to their new community – and vice versa: lecturers also benefit from informal interaction in order to get used to varieties of English they have not been in contact with yet. The REM programme therefore offers various opportunities for building rapport at the beginning of the course, such as for example a welcome dinner where new students meet their lecturers or a field trip to the local landmark mountain Schauinsland which combines a first introduction to the field of studies with a hiking tour.

Last but not least, suggestion #5 should encourage lecturers to facilitate interaction in the EMI classroom. Due to insecurity on how to deal with potentially unclear student utterances, some lecturers tend to refrain from involving their students and just adhere to their Power Point slides throughout the lesson (13).

(13) "Power Point is ONE tool for teaching and it is not the only possible option, neither is it necessary to use as many slides as possible come hell or high water." (German student)

Yet, lectures are generally hard(er) to follow in a foreign language and particularly so if they comprise 90-minute monologues by the lecturer without any single opportunity for students to ask anything. Lecturers would do well if they just risked potential miscommunication and involved their students through questions or tasks or through facilitating a discussion.

Conclusion

We have seen that English-medium instruction is far more complex than just switching from a local language to English in the classroom. Students and lecturers in EMI programmes are for the most part non-native speakers of English who have to face the challenge of learning and teaching through a foreign language. The fact that EMI programmes usually attract a highly diverse international student body adds a further element of complexity. Students do not only speak different first languages, but also have different cultural and academic backgrounds and therefore bring in varying degrees of (un)familiarity with the local learning culture and the linguacultural habitat of the EMI programme. The interplay between these three core challenges can be subsumed under the *EMI triangle* (Figure 2).

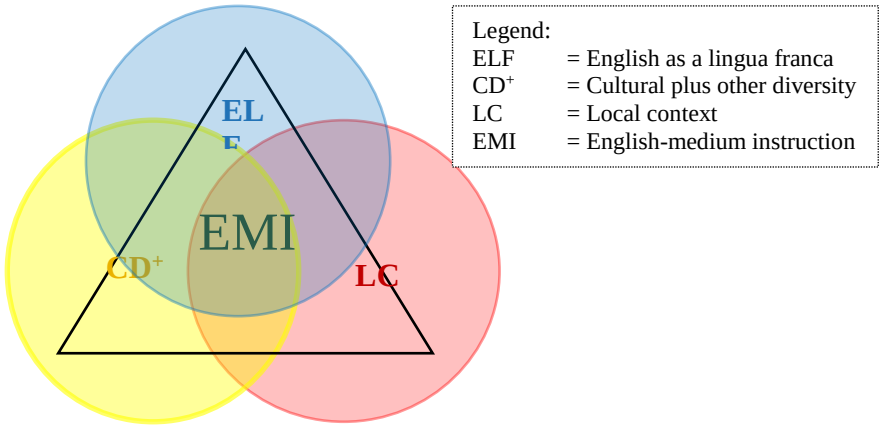

Figure 2: The EMI triangle, representing the interplay of language, culture and local context (Gundermann, 2014).

It lies in the nature of human interaction that linguistic difficulties are more obvious and thus easier to perceive in communication than intercultural challenges. In order to enhance the quality of learning and teaching in EMI programmes, lecturers need to raise their awareness to the threefold complexity of EMI and adjust their teaching accordingly. Five immediate strategies for lecturers as suggested by REM students can already help to improve students' learning progress in the EMI classroom.

However, sustainable EMI quality assurance needs to integrate long-term measures to be established and supported by the host institution.

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INTEGRATIVE GENDERING IN HIGHER EDUCATION IN FOREST SCIENCES: A STRATEGY FOR UNIVERSITY STRUCTURES, TEACHING AND DIDACTICS

BETTINA JANSEN-SCHULZ, SIEGFRIED LEWARK

Abstract
In the course of the Bologna Process "gender equity" has been legally established as a goal for universities throughout Europe. Furthermore, "gender" has been accepted by the German accreditation council as a quality related criterion for accrediting all study programmes, thus supporting a '"top-down" process. Within the accreditation and re-accreditation processes which have already taken place, universities have considered gender aspects and later on also diversity aspects to varying degrees and have implemented different strategies. Integrative gendering is a strategy for consideration of gender & diversity dimensions in higher education – also in STEM (science, technology, engineering, mathematics) disciplines and forest sciences as a STEM discipline.

Gender & diversity aspects in higher education of STEM should be integrated not only into the content, but also into behaviour and awareness. Gender & diversity related dimensions and knowledge affect the professional skills and the knowledge of the actors in the higher education system.

In the future, university and college teachers not only have to acquire gender & diversity competence, but also have to be able to teach it to others and take it into account in their research. Students of forestry need to obtain these skills, because they will be considered a key competence in their future work. Moreover, establishing gender equity among teachers, researchers and students will bring with it a new realm of aspects and perspectives, greatly contributing to the content in each of these areas. Innovative processes will thus be promoted and the faculty habitus and culture can be changed, leading in the long run to a shift of paradigm within academia and to more women in all status-groups of the STEM disciplines.

The need for gender & diversity competence in the forest based sector and for including gender issues into research and teaching in forest sciences is derived from the observation that forestry is a gendered field of occupation. Examples of including gender issues into forestry study programmes are described.

Keywords: gender & diversity, forestry, science, higher education

Introduction

The working life is gendered, it is structured and performed in a way which is explained by gender differences. This is probably for forestry even more true than for many other sectors of occupation and has been studied and proved many times over the last two or three decades (e.g. Colfer, 2000, Lidestav and Reed, 2010, Mwangi and May, 2011). Higher education is preparing for leading roles in working life, which therefore must include gender competence, more recently gender & diversity competence. This line of thought is leading to higher education and didactic approaches for implementation, which will be outlined in the first part of this text.

As a part of the EU policy of gender mainstreaming "gender equity" has been included in the Bologna Process, to be established in higher education throughout Europe. Universities have meanwhile considered gender and more generally diversity aspects to varying degrees and have different strategies for implementation, including accreditation. Integrative gendering (Jansen-Schulz, 2005) is a way for consideration of gender & diversity dimensions, also in disciplines like STEM (science, technology, engineering, mathematics). Forest sciences may be seen as a STEM discipline, and there are examples of including gender issues in forestry study programmes, implicitly and explicitly. Some will be presented below.

Universities today are subject to strong pressure to compete with each other. They not only have to attract more students in general, but also need to attract more women in scientific and technical subjects, and gender & diversity is a corporate identity element for university marketing. In most of the German, Austrian and other European universities and universities of applied sciences there are projects for integrating aspects of gender & diversity in research, teaching and organisational structures. As a result of considering gender & diversity aspects the faculty culture especially within natural sciences and engineering will change, in both, its habitus as well as its content and approaches to education.

STEM disciplines are still mostly traditionally oriented on technology. The teaching habitus still emphasizes dominance, distance and hierarchy. It sequentially presents subject content instead of referring to the connections and implications. Furthermore, teaching methods often tend to fail to promote social competences necessary for adopting independent, scientific, holistic ways of thinking and learning. Thus this situation discourages many women – as well as a lot of men – from studying in these fields (Münst, 2005). STEM studies must become more attractive, designing a holistic, modern image of mathematics, information and technology sciences. In order to achieve this special strategies are required, one of which is to empower the universities actors' gender & diversity key competence.

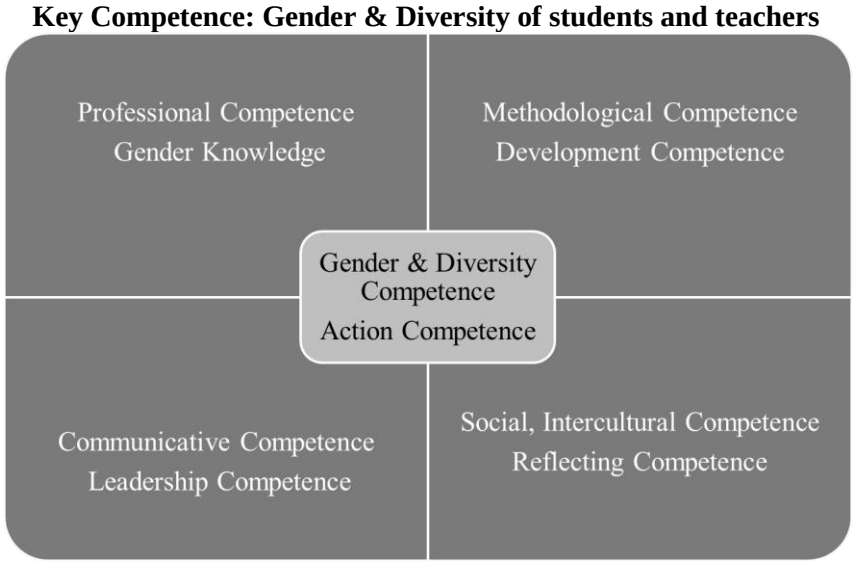

Figure 1: Classification of gender & diversity competence as key competence.

Gender & diversity competence

Researchers, teachers and administrators in the related academic structures need gender & diversity competence. This is an action competence classified in the centre of professional competence, methodological competence and social, inter-cultural and communicative competence (Figure 1). Gender competence is aimed at abilities to recognize gender situation and gender equality in all fields of academic action, diversity is accounting for the different characteristics of actors in academic fields, who are the human potential of a university. Gender is considered as transfer category of diversity categories, of which the big six are gender, age, race, religion, sexual orientation and disability.

Integrative gendering aims at gradually changing the specific faculty cultures and communicating gender & diversity related competences as key competences both for teachers as well as students. The integrative gendering approach is theoretically based on an integrative understanding of education (Chur, 2005), which takes into account all of the teaching methods and fields of action in the higher education system. Integrative gendering is applicable not only to the content, but also to behaviour and levels of awareness. Gender & diversity related aspects and knowledge affect the professional skills and knowledge of the actors in the higher education system.

Integrative gendering takes place simultaneously on a number of levels and encompasses both, gender & diversity oriented teaching methods, gender & diversity teaching modules, as well as empowering women through situational mono-gender courses and mentoring models for women (Roloff and Selent, 2003; Hilgemann *et al*., 2012).

Since 2004, the strategy "integrative gendering" was developed by the first author and tested at the Leuphana University Lueneburg (Jansen-Schulz, 2005; 2008a; 2008b; 2010). She worked with this strategy in more than 30 national and international universities and universities of applied sciences in the last 11 years. In the last four years, she implemented it in the University of Luebeck in the higher education didactic programme. It is now a part of best practice models of the gender equality in research and in the academia toolbox of the DFG (Deutsche Forschungsgemeinschaft; DFG, no year).

In December 2005 the national German accreditation council agreed upon gender & diversity as a criterion (Criterion 10.4) for certifying accreditation agencies. Agencies are to verify "the implementation of the universities concept for promoting gender equity in the given programmes". Since 2006 gender equity is an official criterion for all accreditations, re-accredetations and system accreditations (Criterion 2; Hilgemann *et al*., 2012).

Principles of good gender & diversity teaching

Gender & diversity sensitive programmes impart knowledge about gender & diversity categories to

- Women oriented studies (content wise and didactically),
- Teaching modules (structurally), and
- Research (theoretically).

Women oriented programmes (which are helpful for men's learning processes as well) are characterized by course content and teaching methods of 15 principles of good and gender & diversity oriented teaching (Jansen-Schulz, 2005):

- Application referral in everyday and workaday life.
- Inter-disciplinarity of the content.
- Professional occupation referring.
- Intercultural aspects.
- Emphasis on communication competence.
- Variety of teaching and learning methods.
- Project studies – problem based learning.
- Switch from theory to experience from the beginning.
- Holistic, ecological and social sustainability approach.
- Part time studies.
- Check of the need of the higher mathematics content and its application in basic courses in STEM and economic subjects.
- Transfer of the contents into different practice levels and enabling practice contacts and practice experiences.
- Female role models in technical fields and nature related sciences.

- Holistic approaches, technology impact assessment, considering gender & diversity aspects.
- Individual reflection about own role models of gender and diversity by teachers and students.

A German wide study in 2005 (Becker *et al*., 2006 [new editions in 2012 by Hilgemann *et al*.]) about integrative strategies of gender issues in research and higher education teaching showed, that there were several strategies concerning gender issues. One of them is the integrative approach. Figure 2 shows the different strategies. Figure 3 shows the strategy of the integrative approach for every day teaching gender & diversity.

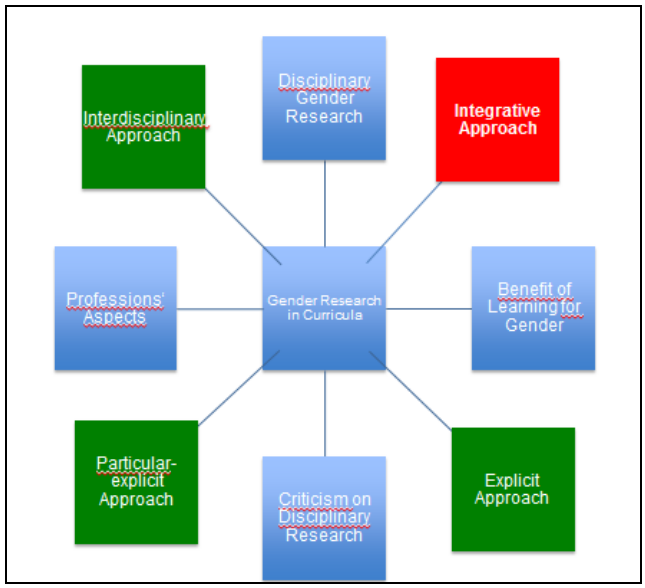

Figure 2: Didactic approaches for an integrative gendering strategy.

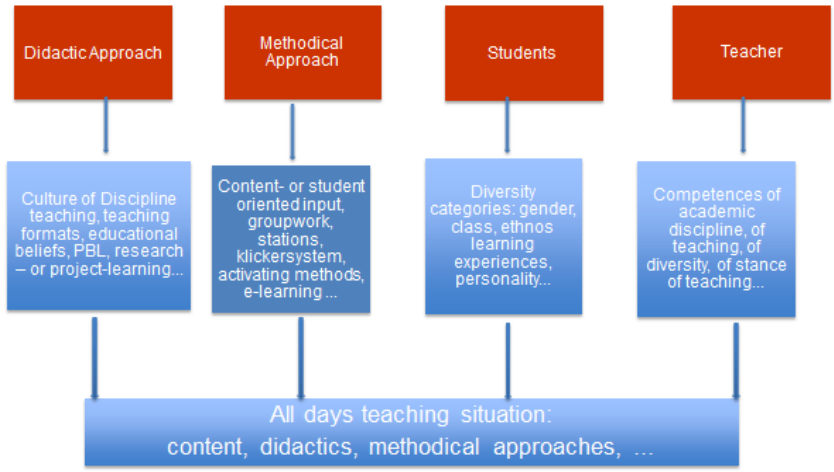

Figure 3: Contents and didactic and methodical approaches of integrative gendering.

Gender & diversity related teaching modules

Teaching modules have to be structurally designed so that they do not exclude women, men or any other groups as Becker *et al*. (2006) found out in their research.

This means that

- Both gender & diversity homogeneous and heterogeneous courses are offered.
- Courses in women's, men's and gender & diversity studies are offered which also integrate gender & diversity oriented research and teaching methods.
- Structurally there are opportunities for inter-disciplinarity and subject diversity.
- Aspects of social and natural sciences as well as technology are offered to everyone, especially through cross disciplinary, i.e. unrelated courses.
- Developing networks involving various disciplines (natural sciences, technology, humanities) is facilitated.
- Disciplines are also oriented to areas of professional activity.
- Studies can be completed part-time or full-time and student workloads are manageable for those with families.
- Programmes are evaluated with regards to gender & diversity aspects as part of the university's quality management.

This approach makes it possible to work on concrete situations and questions which confront teaching and planning staff. The contents, on which the teachers worked with the coach (the author) are the 15 principles and the didactic aims for the integrative approach (see Figure 2).

Doing gender in forestry

The reasoning for including gender issues into research and teaching in forest sciences starts with the observation that forestry is a gendered field of occupation as stated in the beginning of this text. This is becoming obvious by doing gender.

What is gender doing? Gender doing means the attribution of gender issues in social situations or on persons without a critical view. Those attributions may become manifest in ideas and opinions about what women and men are and do. Gender doing is found often in photos of activities in forestry: Working with big machines is often done by men, whereas manual work like planting is done by women.

Other examples of doing gender in forestry are descriptions of forestry work and careers. The description of the Pacific Forest Foundation has no gender doing at first glance, but together with the attached photos one may see gender doing:
"Modern forest management employs many "technicians", who are skilled people experienced ***in the "technical" tasks that do not necessarily engage heavy***

equipment, tools or arduous labour. *These methodological forestry tasks are considered "technical," because they depend on applied-knowledge & skills in data recording, instruments, measurements, location, designation, interpretation, inspection, assessment, judgment, planning, monitoring, negotiation, supervision, and written & verbal communication."* (Pacific Forest Foundation, no year).

Figures 4, 5, 6: forest worker, forestry professional, forestry technician (Pacific Forest Foundation, no year).

The photos (Figures 4-6) show a man with a power saw (left), a man who is measuring something (middle) and a women who is looking through a measuring device (right), underlined "Forest Worker", "Forestry Professional" and "Forestry Technician". This places the men in a higher status than the woman. So here gender doing is made in two ways: allocation of superiority in the skills and in the status.

The next example – no doing gender: photos (Figures 7-8) from the University of British Columbia (UBC, Vancouver, Faculty of Forestry) show faculty members on work (UBC, no year):

- A woman working together with a man (left), and
- Women and men preparing for their job in forestry (right).

Figures 7, 8: Forestry faculty members on work (UBC, no year).

Other situations from forestry, where texts or photos would lend themselves for analysis of doing gender could be:

- Women working outside.
- Historical attributions of women and men in forestry.
- Students and workers with different nationality and ethnicity background in forestry.
- Gender & diversity attributions in forestry politics.

Gender gap data and mainstreaming in the forest based sector

An example to integrate gender aspects into the forest based sector is an approach of gender mainstreaming as described by Westermayer for a national park (Westermayer, 2009 (based on Hayn, 2005; 2006)):

- "*Between 2002 and 2005, the "Institut für sozial-ökologische Forschung" (ISOE) developed a gender mainstreaming concept for the "Nationalpark Eifel."*
- *Guidelines for*
  - *public relations,*
  - *environmental education and for*
  - *socio-economic monitoring.*
- *ISOE developed a "Checklist for gender-sensitive print publications"*

- *What is the target group? Are relevant interests of women and men different?*
- *Is the language inclusive for men and women? Is it still readable?*
- *What about pictures? Are women and men shown? Are the pictures used attractive for men and for women? Do they enforce stereotypes?*
- *Are there topics in the publication interesting for women and men? Are achievements of men and women visible and presented in an equal way?"*

And – according to diversity aspects:

- Can disabled persons get into the forest, can they read, can they hear all lessons?
- Are there students, colleagues from other cultures and how do they follow the lessons, the research?

The last point seems to be needless to mention for forest sciences, for this discipline is extremely international, but it should still be verified with respect to diversity categories.

Very impressing to show the gender gap in forestry (and in other sectors too) are statistics. They can demonstrate the gender gap even when students or colleagues do not want believe it.

A graduate analysis of the female graduates of the Department of Forestry an Environmental Management of the University for Applied Science and Arts in Hildesheim, Holzminden, Göttingen) resulted in numbers of female students and information about careers of female graduates. (Schmaltz, 2002). Figure 9 shows the growing, but still quite low numbers of female graduates in forestry.

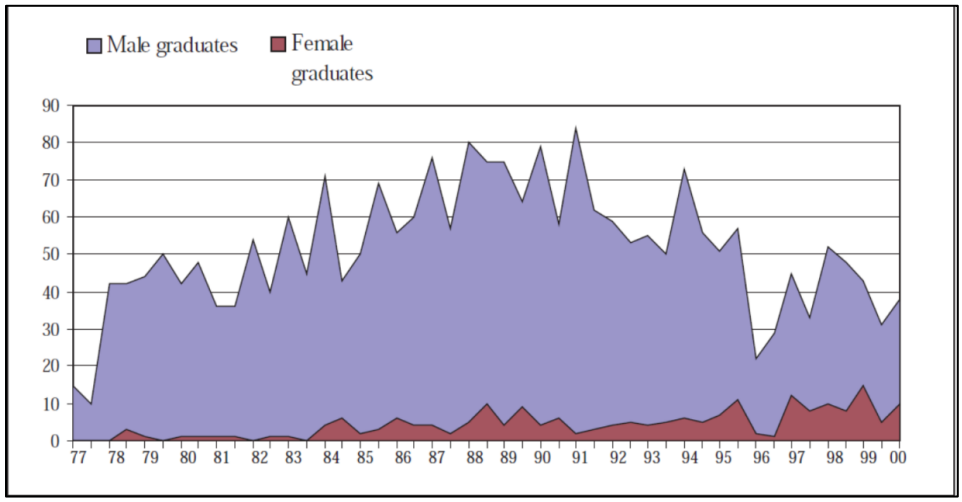

Figure 9: Numbers of forestry graduates (summer and winter semesters 1977-2002) at the University of Applied Science and Arts in Hildesheim/Holzminden/Göttingen (Schmaltz, 2002).

Schmaltz (2002) found, that in 2002 only 19% of the women got an employment in forestry immediately after graduation, as compared to 90 % of the female graduates of the first ten years (1978-1987). Figure 10 shows the dominance of employment in forestry of all graduates up to 2002.

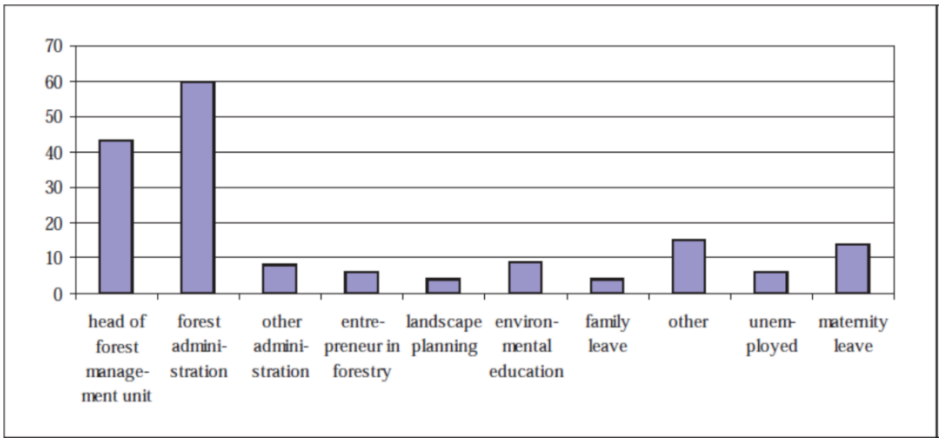

Figure 10: Employment in of female forestry graduates 2001/2002 (n=155; absolute numbers, women on maternity leave also named their type of employment. (Schmaltz, 2002).

A diagram of gender ratio in 2002 (Figure 11) shows the minor role of women in forestry occupations. There are few data published about current employment of women in forestry. In the state forest service of North Rhine-Westphalia (NRW) the number of employed women rose from nearly 20% to 31% over ten years up to 2012 (Wiebe, 2012).

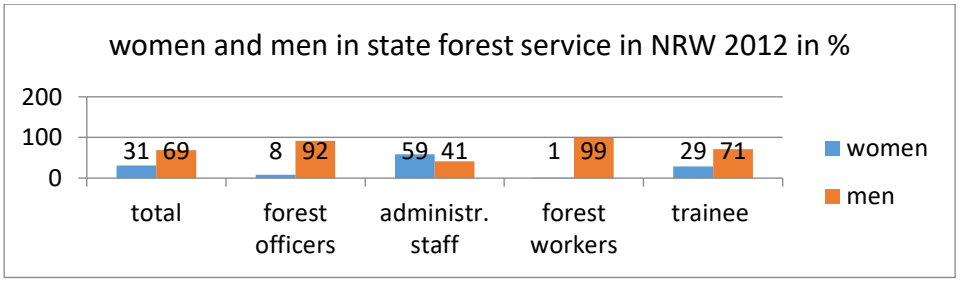

Figure 11: Women in the State Forest Service in NRW 2012 (in %, n=1270) (own calculations based on data from Wiebe, 2012).

Gender in research in forest sciences

Research on gender in forestry will not be elaborated on in this text. It is possible in the following fields, among others:

- Work, politics, economy;
- Structure of forestry working fields;
- Phases of life, life situations;

- Health and body;
- Education and culture;
- Women movement and equality policies.

In all those fields gender is an issue in the all-day action and often there is a sort of "gender doing" going on. A recent article about a female forester in the German women's magazine "Brigitte"(2016) shows, that there are still a lot of prejudices about women in forestry and that they still have problems in their careers. Under a diversity perspective it could be interesting, whether there are different gender-gaps in the forestry sector of different countries.

Gender in forest science curricula

The gendered situation of forestry calls for gender & diversity competences. Students and graduates should know, how gender & diversity aspects affect forestry, so that they can act adequately, effectively and economically in their respective tasks. Lewark developed ideas about integrating gender issues in forestry curricula (Lewark, 2002).

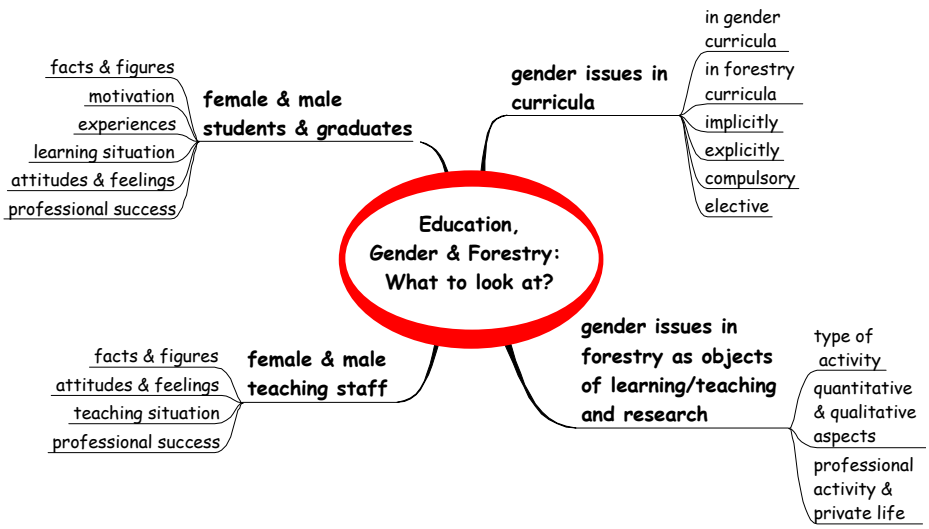

Figure 12: "Fields of interest of the IUFRO unit Education, Gender and Forestry (6.18.02) structured in a mindmap" (Lewark, 2002; 2006).

Ten years later Hehn and Lewark (in English: 2012, based on Lewark *et al.*, 2006) still describe possible aims and ways of integrating gender aspects into forestry curricula and give examples of courses including gender issues.

„The aim of integrating gender aspects into forestry degrees should be to teach students the basic theories and methods of gender studies and to familiarise them with empirical findings from this area. Students should be able to recognise the

importance of the category of gender in the individual subject areas (Ecology, Production & Use, Society & Economy) of their degrees, and to question content on this basis. Graduates in the "green sector" should be capable of viewing the human use and protection of the forest ecosystem in an economical, social and socioeconomical manner from a gender-sensitive perspective. They should also be able to recognise and analyse problems and develop possible solutions." (Hehn and Lewark, 2012)

Hehn and Lewark (2012) also list gender topics for the development of forest science curricula:
"…Alongside ecological aspects, the degree also deals with the basic socioeconomic aspects of the use and protection of forest ecosystems, and thus implicitly with issues of women's and gender studies. This involves the following questions:

- *Are there gender-specific types of use of forest, wood and non-wood products?*
- *How are access, use and control of natural resources distributed?*
- *Which power and domination structures in forest use are perpetuated or changed by gendered division of labour?*
- *What effects do aspects of modernisation/globalisation have on gendered division of labour in forest use and what consequences do they have for gender relations?*

Gender aspects are relevant to the following three subject areas within the degree course:

- *Theory of gender studies (not forest-specific).*
- *Empirical research in women's and gender studies.*
- *Studies on university and professional practice."*

The international spring school GenCom

Next an example of approaches to integrate gender aspects into the teaching of forestry from the University of Freiburg is described, (organized by the second author, with participation of the first author) – more are described by Lewark (2008) and Lewark and Karmann (2015).

In the international spring school GenCom ("Developing gender competence in higher education programmes on natural resources management") at BOKU, Vienna, 2011, the aim was developing gender competence in higher education programmes on natural resource management (Lewark and Karmann, 2015; Ebenfeld *et al*., 2012). The first author participated and worked out together with the participants: gender & diversity studies around the world – topics on gender studies in forest and agriculture and environmental sciences:

- The students had to find out about gender studies in several universities around the world, also in countries, where they are not common.

- We read and found out, where gender-studies are in the curricula or in the universities' structures and what can that mean for the understanding of the students of the spring school.
- We collected input through reading articles, discussing in groups and reporting following gender-aspects:
- What and where did the students study?
    - What did they miss?
    - Can you find it in the study concepts?
    - What should those studies offer in the different countries?

The findings of the students on these topics showed a high level of reflection about gender & diversity structures in forestry and in individual gender & diversity positions.

Outlook

The text is supposed to show that it is possible to integrate gender & diversity aspects and approaches into universities structures, forestry curricula and teaching and into higher education didactic programmes. Universities try different methods of integrating these approaches. One of the most effective methods is integrating gender & diversity aspects into the daily processes of teaching, planning and organization. But the actors need gender & diversity competence, which they can develop through e.g. learning by doing, through looking on gender & diversity issues from different perspectives in different courses of higher education.
An individual interest in structural, didactic and social impacts of gender & diversity learning and teaching situations in universities is necessary, and also an open gender & diversity orientated top-down university management.

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CONCLUDING REMARKS

SIEGFRIED LEWARK

Should all forest sciences students learn the same? Is this still really an adequate question, or rather a rhetoric question, if we think of practice orientation and of envisaging specific occupations, even if we do not know the individual future occupations of these students. Preparing for labour markets in their respective countries forestry students certainly should not learn the same. Hence, are the discussions about a standard curriculum within Europe obsolete? Another question would be, whether students ever learned the same, even in study programmes, that do not give room for any choice to select contents.

The dispute about specialization in the 1990s in Germany – an example

Going for individual competence profiles was in stark contrast to the demands which were traditionally formulated by the German public forest services, as they probably originally were formulated in many other European countries too. The forest services wanted to employ well qualified graduates who were to have all the same knowledge, even before any traineeship at the beginning of employment. This traditional thinking was based on the idea, that all of their staff in a certain civil service career should be prepared for all occupations.

This was the situation which the German forestry faculties faced, when a phase of study reforms was started in the 1990s. The Freiburg Faculty of Forestry, attempting a major curriculum revision and in recognising the developments of the labour market, with a diminishing role of the forest service as employers for their graduates, tried to square the circle. The basic ideas were to aim at individual competence profiles by raising the share of electives to half of the individual study programmes and introducing several new ways of assessment of learning results, while at the same time completely avoiding the term of specialization in the many and hot discussions generated by the study reforms. Specialization would have been, for the forest services, like a red rag for a bull. So an accusation of specialization in a new study programme would automatically come along with a refusal of acceptance. As a consequence we will not find the term specialization in the documents and publications from that time, which has been avoided meticulously from the side of the forestry faculties. Instead terms like exemplary learning, individual learning profiles or deepening of knowledge in certain subjects have been used, in order to describe what has been attempted and realized.

This was the situation in Germany twenty years ago, ten years before the Bologna process became reality in higher forestry education. But looking back may still be

helpful in revealing insights into the matter of obligatory "core studies" and specialization. In addition it has some charm for me to use this example because of my intimate knowledge of the extraordinary intensive discussions during the processes of study reforms in the 1990s in Germany and at the Forestry Faculty of the University of Freiburg in particular. Moreover, these discussions in Germany are quite well documented in publications, as compared with the changes in other European countries (e.g. Weber and Lewark, 2005; Lewark, 1998). This is especially true for Freiburg, though admittedly there are more publications in German than in English, and not all are available through internet today.

This is not the place for going into any details of the resulting curricula in Freiburg and at the other German forestry faculties. But some principles and concepts are of interest for the discussion of the question "should they all learn the same?". They may help to formulate the right questions when looking at the contributions to the conference.

Concepts of specialization

First, do we all mean the same when talking about specialization in higher forestry education? Obviously the situation is less clear today as compared to that twenty years ago. A simple approach to a definition: Specialization shows in special knowledge and skills, which one has, that others do not have – connected with a choice to go for such knowledge and skills, while others choose some other specialization.

There is a traditional specialization. which goes along with the experience from diploma or Bachelor or Master theses, as also mentioned by Epema *et al*. (this volume). This type of thesis was introduced into the forestry curricula in Europe at different times, in German for instance it was introduced only in the 1970s. Having this type of specialized competences seems to be self-understood and we do not have it in mind when discussing the pros and contras of specialization. There are also special knowledge and skills, which students already bring along with them when coming to university, talents or gifts, which we also do not think about.

The conference question is rather aiming at a specialization, at concepts, which are resulting from special efforts of the higher education institutions. Specialization understood this way may go more or less deep and be realized by different decisions of the faculties about the curriculum structures and contents. But it is not only about study contents or structures, other aspects of specialization shall only be mentioned here like generic versus subject specific or scientific versus professional competences. Specialization could also be deeper knowledge and skills for some in a field of subjects, which belongs to the obligatory core study programme. Learning and teaching methods will also contribute to the degree of specialization.

Some degree of specialization may result from electives, depending on their share in the curricula, and perhaps on the ways to choose them and their design. Would this already be a real specialization? A different concept would be complete independent study programmes as we find them more and more on the route of diversification at many forestry faculties – even more so when the faculties are broader than just covering forest sciences, as a result from mergers of earlier independent faculties or from the very beginning, like in the Netherlands (Epema *et al*., this volume), where Wageningen University consists from the start till now of only one faculty.

Between these different concepts we find bundling of subjects into defined fields of subjects. That may be structured more or less formalised, with more or less choice within, from a loose offer to a choice between strictly defined fields, where more or less all courses are obligatory. These fields of subjects may have different names like directions or minors (terms in local languages or in English), defining distinct smaller curricula or parts of curricula (as opposed to majors, the name giving bigger parts of the study programmes).

All of these concepts we find in the forestry study programmes in Europe, and a good deal in the contributions to this volume. I cannot describe the examples here. What do these concepts mean? How well have they been accepted? What happened with the Bologna process? And finally, what can be learned from all this for the main question of the conference? We find some answers and good examples in the texts of these proceedings. The authors of three texts obviously felt challenged to tackle the question of the conference directly (Epema *et al*., Müller-Starck and Weber, Lackner *et al*., all this volume), but the other texts also show a development towards diversification and possibilities for students to select contents. This applies to choices within study programmes as well as between different study programmes. The times of forestry faculties with just one study programme, which were traditionally found in many European countries, are obviously over after the implementation of the requirements of the Bologna process.

Outlook

Is the question of the conference about specialization not an exciting one any more, after all? Or is it meanwhile so self-evident that teachers go for individual competence profiles of the students – as they would do themselves – that it is not a challenge for discussion anymore? But then we would have the question shifting from "should they learn the same?" to "how could we, teachers and faculties, help them in the best way to learn not the same?". The individual competences are the assets of the graduates, their advantages in competition. At the same time differences result from the regional embedding of the universities as stated already in the introduction, referring to the discussions at the SILVA Network conference in Wageningen 2005 (Lewark *et al*., 2006). This thinking leads to the demand on the higher education institutions to not only allow, but to promote a differentiation of their professional competence profiles.

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ON SILVA NETWORK'S BOARD 2007-2015

At the end of the 2015 General Assembly during the annual meeting of the SILVA Network in Vienna, Siegfried Lewark from the University of Freiburg stepped down as President of the SILVA Network. Siegfried Lewark involved himself for the first time in the SILVA Network in 1991, during the meeting of the Network in the University Forest of his home university. His active interest in forestry education, more than the obligation to represent his university, moved him to participate in the SILVA Network in a stimulating manner. When Paavo Pelkonen in 2007 left the SILVA Network, both Siegfried Lewark and Gerhard Müller-Starck from the Technische Universität München realised the importance of the SILVA Network and both stepped forward to chair the SILVA Network. They together decided to do this four-years job as a tandem[11], the one as President, the other as Vice-President, changing the job half way, and proposed this to the General Assembly. In 2011[12] the General Assembly decided to continue Siegfried Lewark as President, and not to fill up the position of the Vice-President. Martin Ziesak from Bern University of Applied Sciences was appointed Vice-President in 2014. He succeeded in 2016 Siegfried Lewark as President and Norbert Weber from the Technische Universität Dresden joined as Vice-President. A complete overview[13] of the Presidents of the SILVA Network is given in Table 1.

Table 1: Board of the SILVA Network

Period	President	Affiliation	Vice-President	Affiliation
1987-1997	Pieter Schmidt	Wageningen University		
1997-2007	Paavo Pelkonen	University of Eastern Finland		
2007-2009	Siegfried Lewark	University of Freiburg	Gerhard Müller-Starck	Technische Universität München
2009-2011	Gerhard Müller-Starck	Technische Universität München	Siegfried Lewark	University of Freiburg
2012-2014	Siegfried Lewark	University of Freiburg		
2014-2016	Siegfried Lewark	University of Freiburg	Martin Ziesak	Bern University of Applied Sciences
2016-	Martin Ziesak	Bern University of Applied sciences	Norbert Weber	Technische Universität Dresden

[11] See SILVA Network Publications 5, p. V

[12] See SILVA Network Publications 9, p. 93

[13] An overview of SILVA Network's history was published by Schmidt, P and Lewark, S., 2014: The SILVA Network embedded in the development of forestry science education in Europe, 1987-2011. Pp. 71-86 in Schmidt, P., Müller-Starck, G., Chubinsky, A. and Lewark, S. (Eds.): Bologna cycles 1 to 3 and higher forest education – objectives and reality. SILVA Network Publication 9.

Many thanks are due to these two men, to Siegfried Lewark and to Gerhard Müller-Starck. Each did it in his own way, with an emphasis on those aspects they valuated. And they both carried on with this job after their official obligations at their home university were finished. Gerhard Müller-Starck paid attention to all three Bologna cycles and to learning sojourns abroad, Siegfried Lewark, with many publications on forestry education on his name, to E-learning, gender aspects, didactics and cooperation with other at education aimed institutions like IPFE and special working groups of IUFRO. Tribute and thanks are aimed at both Siegfried and Gerhard.

Pieter Schmidt,
Founder of SILVA Network and first President

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