ICT IN HIGHER FORESTRY EDUCATION IN EUROPE

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The SILVA Network is a European Academic Network for Forest Sciences and a Standing Committee for Forestry of ICA (Interuniversity Consortium for Agriculture and Related Sciences). The SILVA Network, established in 1989, is a non-profit academic organization concerned with higher forestry education in Europe. At present the Network has over 40 member institutions involved in higher forestry education representing most European countries.

The SILVA Network is stimulating and facilitating educational co-operation in the field of forestry in Europe. The activities to reach the objectives include e.g. seminars and workshops, student and staff mobility, joint education and enhancing the use of ICT (Information and Communication Technology) in education. The ultimate aim is to maintain and improve the high quality, competence and attractiveness of European forestry education in Europe and in a global context.

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Introduction

Background

The knowledge society depends for its growth on the production of new knowledge, its transmission through education and training, its dissemination through information and communication technologies, and on its use through new industrial processes or services. The European university landscape is characterized by a high degree of heterogeneity which is reflected in organization, governance and operation conditions. The structural reforms inspired by the Bologna process constitute an effort to organize that diversity within a more coherent and compatible European framework, which is a condition for the readability, and hence the competitiveness, of European universities both within Europe itself and in the whole world. (COM(2003) 58).

Higher education has been undergoing major changes in the past few years. Comparability, compatibility of studies, co-operational activities and wide access to education have been the key ideas of educational strategies and discussions. The focus is on an open and dynamic European educational area and finally better competence in global educational markets (e.g. COM(1999)750, Reichter & Tauch 2003).

The Bologna declaration is leading the European Union towards overall convergence in higher education, but still today the demands and size of studies, the whole educational tradition varies remarkably inside the Europe. Most European countries are committed to attain the Bologna declaration's objectives in a few years. The possibilities to co-operate and to offer students far more choices are expanding. On the other hand, this means also expanding competition and demand for quality standards or certification system for universities to attract students and experts in an international markets. Education is more and more viewed as a "product", rather than a "public good" (Bernd Wächter 2002).

The European Union and it's common educational policy (the Bologna process, increasing numbers of exchange programs and international students) are creating a pan-European educational area and creating a demand for a common educational language. This would provide larger market area than earlier but at the same time also competition for students and funding is going to be more international - a challenging task for universities used to acting in a national environment. It brings out the need of creating new kind of competitive strategies for universities (see also Bates 2000).

As standardization or uniformisation is not the aim of the development of European higher education, the increasing convergence is offering tempting possibilities for universities to specialize in their key areas. ICT can give tools to easily and cost effectively create special or tailor made courses for international markets. It is no longer necessary for each university to produce the complete spectrum of courses to be competitive, the competitiveness could be created more and more through co-operational skills and networking. An effective educational networks would enhance the attractiveness of European higher education over the other continents. In ACA's (Academic Cooperation Association) report to European Comission Reichert and Wächter (2000) pointed out that even though the EU's student mobility is well developed it is not competitive enough on the international market. As an example, in

2000 the European Union attracted some 45 000 students from other countries, while their American counterparts drew over 540 000, mostly from Asia (COM(2003) 58).

Student and staff exchange emphasizes the human dimensions and cultural understanding inside Europe and between continents, but it is no longer necessary for gaining expertise in certain educational field. Travelling and free mobility for studies is by no means possible or even desirable for everybody for economic, social, health or other reasons, unnecessary traveling could be required to be restricted also for environmental reasons. In spite of that, to be able to offer equal opportunities to everybody, even in the most remote areas of Europe, virtual mobility activities should seriously be strengthened. The supplying of international education opportunities and expertise could be brought available in almost any location using ICT.

However, e-Learning will not, and is not an attempt to put an end to face-to-face tuition or physical student and staff mobility programs. Virtual mobility can possibly provide an impulse to physical mobility, desire to go abroad (**Scott 2002**). E-learning is more an additional dimension and optional way to study and use tailor-made individual study programmes than a substitute for traditional education. It provides a way to share and bring extra expertise; courses we need from somewhere else or a way to continue interactive learning after the face-to-face situation to complement studies. In other words it provides facilities to offer better services to students, increase equality between regions and individuals, raise the quality and availability of universities' educational supply and a way to increase the effectiveness of teachers.

Summary
The SILVA Network aims to develop co-operation and competitiveness of European higher forestry education. One of the major means has been the attempt to fully utilize the opportunities and challenges new ICT is offering to the education sector. The lessons learned have been that the success can only be achieved step by step and most of all by creating favorable preconditions for joint education. Furthermore, with the support of the development of co-operation comes a gradual building of virtual services and educational tools. This means shared regulations and integrated and exchangeable curriculas, the fully recognition of studies from different universities throughout the Europe.

In this publication European experts in forestry education and e-learning are offering an interesting continuum of articles that are covering the topics from educational policy issues, curricula development, student perspectives, national experiences and tool development to ideas of virtual European faculty and good practice guidelines in virtual forestry education.

President of the SILVA Network, Paavo Pelkonen describes the enlargement of the educational field in forestry from utility and preservation to aesthetics and social and cultural elements of sustainability. In the European integration a natural way would be specialization and cooperation to be able to cover the new areas and at the same time maintain the quality of teaching. He emphasizes the importance of improving students skills for an era of interdisciplinary teams, power sharing and for reflecting national diversity. He sees virtual education as an imperative outcome of the integrated and harmonized European higher education area.

The concept of Virtual European Forestry Faculty is described as a means to achieve more integrated and more mobile European forestry education area. Liisa Tahvanainen emphasises the importance of students' opinions and attitudes in developing virtual education and services. Based on a preliminary survey she concludes the importance for students of international education, independency of time and place and more freedom to plan studies individually.

At institutional level, new forms of international networking through the intensified use of ICT requires better understanding of different institutions and their curriculum in order to arrange joint education. David Gritten has compared the forestry curriculas of several European universities as a precondition for joint virtual studies. He points out the lack of information in comparable and easily available form, in spite of the Bologna declaration in European Union. However, the study showed that there is great potential for combining resources and also complementing each other.

The challenges of the emergence of a true European labour market has resulted problems concerning the recognition of qualifications. This is not only inside the European Union, but is certainly more challenging with enlargement of the Union and in a global context. The demand for higher education is growing worldwide, which, especially in developing and transition countries, cannot be met by national supply. According to Siegfried Lewark and Dirk Längin, ICT offers huge potential for supporting higher forestry education in developing countries. However, they state that limiting factors in developing countries remain bandwidth problems, the absence of applicable hard and software, and high costs for telephone and Internet access. Many of the same problems exist in countries with economies in transition. Anatoly Chubinsky mentions the absence of Internet connections in remote areas, large number of students compared to the number of computers and the high age of the teachers as the main challenges of using ICT in Russia.

An advanced way of utilizing ICT in education is shown us by Worhle, Scheurer, Schack-Kirchner and Hillebrand. In Freiburg, Germany, they are using online teaching units to support the students' independent studies. This as well as the experiences of Carlos Colinas and Blas Mola from Lleida, Spain shows that students tend to have much more learning material than earlier. Once the material is in virtual format it encourages cooperation between universities as has been the case in Forest Pathology teaching in Lleida. Increasing scientific knowledge and the demand for advancing technologies in academic teaching has promoted also the development of the hypermedia content management system COCOON at the University of Natural Resources and Applied Life Science, in Vienna, Austria. Harald Vacik and Bernhard Wolfslehner report positive feedback from students on their efforts to improve the quality of teaching and enhanced the capabilities for the use of online resources.

Tahvanainen, Pelkonen and Tahvanainen introduce other ways in which virtual means can complement activities in internationalisation but also in offering better services to attract students and teachers inside the university. Pedagogical trends are changing the focus in education more and more from teaching, to learning. Supported self-studying is increasing. This can and will challenge methods of assessment as well. With increased internationalization of education also modern testing has to be fitted to the virtual world. Automated assessment methods, self-testing and feed-back systems can

be part of modern educational services. A virtual exam has been used at the University of Joensuu, Finland, for more than three semesters with good results.

The articles and experiences of the SILVA Network seminars are concluded by Erkki Sutinen to "Code for Good Practice in Forestry Education". He clarifies the meaning of virtual education to be the meaningful use of technology in education. He points out that we should use ICT in way that adds value to the existing learning environment, adapts to students' needs and gives students new, functional resources. In addition, ICT overcomes limitations of time and place. "Good practice" can be defined as meaningful behavior under given circumstances. However he emphasizes that for virtual education there does not exist anything like good practice yet, but it has to be developed together with evolving practices, pointing out the need of user feedback for developing quality tools and materials. Finally he points out that "Technology should simplify life; student's life and even teacher's life!".

Virtual forestry education is facing challenges on all levels starting from the absence of Internet connection, phone lines and computers. On the other hand virtual education can provide huge possibilities in taking advantage of cooperation, developing teaching methods and educational services, disseminating knowledge and providing virtual mobility services. The vision of a Virtual European Forestry Faculty has moved towards a joint service platform and virtual community, that could add value by sharing specialization and scarce competency of individual universities. Virtual mobility can provide learning experience with educational and social values, by the collaborative working procedures, resulting skills like ICT, language and inter-cultural skills, and which create and sustain relations between people and between institutions (Aslaksen 2002).

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Objectives and Strategies for Higher Forestry Education in the European Integration

Pelkonen, P.

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For centuries forestry has been an attractive field of study in the European universities. The field has connected the human needs to preserve and utilise forest resources. The concept of sustainable forest management has been applied in education for a couple of hundred years for placing emphasis on the renewable nature of forest resources in its various dimensions from aesthetic to utilitarian values. The recently introduced social and cultural elements of sustainability offer a great challenge for curriculum development. The enlargement of the educational field in forestry requires specialization, and coordination of the universities together with committed partnerships. The comparatively small forestry education units are not able to properly cover the new areas, and at the same time maintain the quality of teaching. The European dimension of forestry education places emphasis on similarities and connecting issues in the fundamental contents related to forests in teaching and learning, and at the same time realises and respects the differences, especially in the social and cultural context of forestry. The search for a balanced expertise for a European dimension requires credible partnership and acceptance of interconnectedness. Education has to improve skills for an era of interdisciplinary teams, power sharing and for reflecting national diversity. The means of a new partnership are the mobility of students, teachers and knowledge and information. Virtual education is an imperative outcome of the integrated and harmonised European higher education area. In order to increase its competitiveness, forestry education has to analyse the needs and requirements of its clients for the next decade. The role of students and their unions and associations is more important than ever. Accepting the young specialist for the planning of future education the universities are thereby taking a proactive rather than reactive role.

Key words: ***higher education, forestry, European integration, curricula development***

The Challenges of the higher education and possibilities opened up by using ICT in education and communication in countries with economic transition

Chubinsky, A.

The main challenges of using ICT in higher education in Russia are 1) the large number of the students – graduates of village and settlement schools, in which the teaching of computer science and computer skills is complicated, partly because of the general economic situation in the country; 2) absence of Internet in the remote areas and 3) high average age of teachers. For providing software and information support in the educational processes in Saint-Petersburg State Forest Technical Academy, a specialized centre of new information technologies in the Forest Complex (SpecCNIT FC) was launched in 2001. The main fields of activity of SpecCNIT FC are operation and modernization of existing subsystems of educational process management, designing and introducing new subsystems in allocated database, expanding a corporate network, maintenance of the Academy web-site and developing information tasks for divisions of the Academy and for customers. The two most obvious outcomes have been trebling of the number of Internet terminals and that between 1998 and 2003 the amount of computers in The Forest Technical Academy increased by 40%.

Key words: higher forestry education, Russia, new information technology

A Power Point presentation

Teacher experiences in online courses: soil physics, soil chemistry and tree physiology

Worhle, N., Scheurer, M., Schack-Kirchner, H. & Hildebrand, E.E.

The Albert-Ludwigs-University Faculty of Forestry in Freiburg started creating online teaching units after the study program reform in 2000. These online teaching units were created to support the students' independent studies and facilitate examination preparation. Online teaching consists of web-based tutorials from different departments in ecology and is therefore called "Forest Ecology Online". These teaching units are available in "ILIAS", the course management system. The units are made up of HTML documents, graphics / pictures as well as animations and interactive exercises. Every teaching unit is associated with a respective course. Evaluations have shown that most of the students are open to e-learning. Although some students were not familiar with using a computer and refused to learn in front of a screen, however the results was generally positive. A further increase of acceptance can be expected due to the worldwide increase in multi-media. Most of the students felt that online-teaching should not replace lectures. On the other hand, 80% agreed to use e-learning for independent study, which is, in fact, the main purpose of "Forest Ecology Online". "Forest Ecology Online" was honoured with the "Landeslehrpreis" in 2002, an award from the German federal state of Baden-Württemberg for outstanding performance in teaching.

Towards Virtual European Forestry Faculty – **a preliminary survey study**

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The consolidation and standardization of European higher education according to the Bologna process, opens up international markets and provides new opportunities. E-learning, with rapidly diverse and expanding number of applications offers possibilities to create international, physically and temporally independent virtual learning environments and offer training products tailored to the needs of customers. ICT (information and communication technologies) offers huge possibilities and competitive advantages for those who have recognized the potential and started to develop their educational supply in time. The European Academic Network for Forest Sciences, SILVA Network, has participated the AFANET – SOCRATES project (Thematic Network for Agriculture, Forestry, Aquaculture and the Environment) to develop a more attractive and competitive European forestry education for international markets by means of ICT and active cooperation in the long term. The ultimate aim of the project was to design and develop the concept of a Virtual European Forestry Faculty. The focus was on supporting the development of distance learning. The customers, the students, are at the core of sustainable educational services. The focus of this article is to describe opinions and attitudes of university students towards virtual education and the idea of the Virtual European Forestry Faculty. As a conclusion it can be said that through shared virtual learning and educational service environment both educational and marketing advantages could be achieved. For students there exists a clear need for virtual education. Students appreciate independence of time and place and they seem to need more freedom to plan their studies individually. Virtual education offers a natural, equal and cost-effective way to international studies and to create international contacts e.g. for practical training or the master thesis phase. To secure meaningful development and good results in international competition usability analyses, customer studies and continuous feedback are needed.

Key words: learning environment, student survey, e-learning, virtual education, forestry education, educational competence

Comparative Analysis of Forestry Curricula for the Development of NICT in Education

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In order to facilitate further co-operation between forestry education institutions there is a need to have a better understanding of the institutions and their curriculum. Improved understanding would enhance student and staff exchange and co-operation in arranging joint courses and master-programs. This article is based on the master thesis for the M.Sc. European Forestry program. The main aim was to compare the forestry curricula of six European universities to define the basis for developing a joint virtual education. The study points out the lack of information in comparable and easily available form; content and sizing of studies can vary a lot which makes it difficult to compare e.g. the workload for studies called "thesis work". In spite of committing to the Bologna declaration, classification and standardisation as well as cooperative minds are still needed in the academic world. However, the study showed that there are many possibilities for combining resources and on the other hand for complementing each other, which can provide more possibilities for specialisation. In most European universities NICT is the tool that offers both efficient and most cost-effective way to take advantage in every-day education of the new resources that can be gained through European networking universities.

Key words: Curricula development, higher forestry education, the Bologna process, information and communication technology

Forest Education in Developing Countries via ICT; Example of Southern Africa

Lewark, S. & Längin, D.

Information and Communication Technologies (ICT) offer huge potential for supporting higher forestry education in developing countries. This is achieved by making use of web base training (wbt) as a distance education tool, as well as the potential to augment and improve on-campus learning at University level by combining computer based learning and face-to-face education – the so-called hybrid learning. First experiences have been gained within a joint research and development project "Modern Information and communication technologies for open distance education in forest science" of the Universities of Stellenbosch, South Africa, and Freiburg, Germany. Limiting factors in developing countries remain: Bandwidth problems, the absence of applicable hard- and software, and especially, the high costs for telephone and Internet access, due to telecommunication monopolies in most of these countries.

Virtual Exam for Student's Convenience

Tahvanainen, L., Pelkonen, P. & Tahvanainen, T.

Web-based learning environments and distance learning offer challenging possibilities for taking advantage of ICT. However, all across Europe university students still pack up their pencils and erasers, and make their way to the overcrowded lecture halls to sit their exams at a fixed time – just as students have done for hundreds of years. Can't we possibly provide anything more flexible?

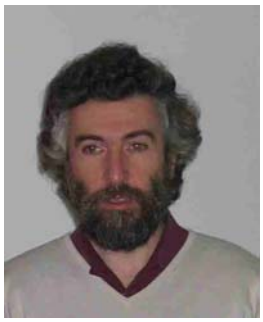
The virtual exam has been one of the most successful educational tools piloted and used at the Forestry Faculty, University of Joensuu in Finland. Both students and teachers have very positive attitudes towards and good experiences of the virtual exam. The application is under continuous development; upcoming options to be attached will be self-assessment and diversified and automated feedback possibilities to enhance the learning process, also aiding the teaching staff. The desire to offer better services for teaching staff and students was the inspiration behind the development of virtual assessment methods and facilities. Developing efficient and at the same time user friendly services provides an excellent benefit in competitive in international educational markets.

Key words: *virtual exam, self-assessment, automated test, Exam Aquarium, survey, web, educational tools*

Use of hypermedia tools and techniques in teaching natural resource management

Vacik, H. & Wolfslehner, B.

Considering the complexity of silvicultural decision problems within multiple-purpose forestry, including various site and stand attributes a multitude of disciplines from the field of natural resources should be integrated in teaching at the university level. Increasing scientific knowledge and the demand for advancing technologies in academic teaching has promoted the development of the hypermedia content management system "COCOON" at the Institute of Silviculture. Using the principle of Blended Learning a combination of online phases and periods of attendance is proposed. A description on how COCOON supports students by unifying different sources of knowledge and learning components is provided. Rationale, challenges and pitfalls of the approach with regard to the demands of cognitive psychology are described.



Uses of ICT in Forest Pathology. Results of Three Years of Experience

Colinas, C. & Mola, B.

The use of ICT in higher education in Spain varies widely among universities and even more between disciplines. This disparity exists for two principle reasons; firstly funding and secondly the attitudes of the faculty members which mostly reflects their experience. From these principles, the development of ICT at The University of Lleida has seen an evolution from the standard class based lecture to a course being almost completely conducted online. There are differing levels of acceptance among lecturers, from openly opposed to the notion of use of ICT, whilst others embrace the concept wholeheartedly. Among the students the attitudes tend to be linked to their computer skills.

The article draws on the practical experience of the Forest Pathology course which is partially taught online, one of the benefits is that students have more material, as it is easier to obtain. Increased network usage reflects improvement of computer skills of the students. It also has facilitated the broadcasting of the course to other countries which has encouraged co-operation. Although the nature of this course, as well as other core forest subjects, does not lend itself to the ICT medium. The development and continuous updating of Virtual Herbarium and co-ordination with field excursions help to overcome these barriers and provide the students with an invaluable tool.

Code For Good Practice in Virtual Education in Forestry

Sutinen, E.

Well designed virtual education can be recognized by the good practices it creates to the teaching-studying-learning process. However, an excellent learning environment, whether virtual or conventional, is seldom if ever a result of following a code in a blind way. Rather, we can identify criteria by which help us to recognize virtual education of high quality. Usually, the crucial factor of a successful virtual learning environment is its development process which takes into account user feedback from the early start onwards and calls eventual users for participation in its design and implementation stages.