COMMUNICATION – A NEGLECTED TOPIC IN HIGHER FORESTRY EDUCATION AND FURTHER EDUCATION?

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Communication – a neglected topic in higher forestry education and further education?

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PREFACE I

In 1997, the SILVA Network organised its first large annual meeting at the Forestry Department of Wageningen University. Based on the oral presentations and the poster-presentations of the actual forestry curricula at about thirty European universities with forestry curricula, the reporting book appeared in 1998, published as DEMETER Series I of ICA. First universities had published at that time already websites with details of their curricula, but a complete overview based on the websites of that time was still not yet possible to be made. This book was the first in its kind and made it possible for teachers and students to survey curricula of forestry universities in a foreign country as a base for students' exchange.

We announce now, nearly thirty year later, that this book in hand is the last of the SILVA Network Publications as a book of proceedings. With this SILVA Network Publication No. 20, the era of the SILVA books with a collection of full papers comes to an end. We are very thankful to all those who have supported us during recent decades, either by contributing articles or being active in the review and publication process. For several reasons, we realized that it is not up-to-date any more to continue with our book editions for a very small number of participants and readers. Even many libraries seem to prefer digital books.

Future reports about SILVA Network conferences will consist of abstracts and will be available as pdf files only. Stay tuned in and take a look at www.ica-silva.eu regularly!

Moreover, we do certainly hope too that in future forestry universities will be able and willing to organise meetings of the SILVA Network in some format, with attention to forestry education and with attention to illustrating this in the forest, in the well-established style of SILVA Network excursions.

We hope that this book, based on the SILVA Network meeting in Sopron in 2023 will find its way to readers, students and teachers in forestry education, all over the world.

Norbert Weber, President SILVA Network

Pieter Schmidt, Founding president SILVA Network and long-time editor

Siegfried Lewark, Former president SILVA Network and long-time editor

SILVA Network Presidents

Pieter Schmidt – Wageningen University and Research. 1987-1997

foto Markku Laukkanen

Paavo Pelkonen – University of Eastern Finland. 1997-2007

Siegfried Lewark – Albert-Ludwig Universität Freiburg im Breisgau. 2007-2009; 2012-2016

Gerhard Müller-Starck – Technische Universität München. 2009-2011

Martin Ziesak – Berner Fachhochschule. 2016-2017

Norbert Weber – Technische Universität Dresden. 2017-2025

PREFACE II

The 2023 Annual Conference of the SILVA Network was hosted by the city of Sopron and the Faculty of Forestry of the University of Sopron, in an environment worthy of our historic traditions. Our institution, which bears one of the oldest legacies in European higher forestry education, remains committed to the international scientific and educational community.

We found the central theme of the conference – the importance of communication in forestry – particularly timely, as the social acceptance of sustainable forest management can only be strengthened through authentic, value-based dialogue. Our education system conveys not only professional knowledge, but also responsible thinking and openness to our students.

We are convinced that belonging to our shared European historical, cultural, and educational heritage is not only a value of our past but also a foundation for shaping our future. By hosting this conference, we sought to support the mission of the SILVA Network: the advancement of higher forestry education in an international context and the reinforcement of the European idea.

I would like to express my gratitude to all those whose work contributed to the creation of this volume, and I sincerely hope that the studies included herein will serve the development of European higher forestry education in the long term.

Dr. Bálint Heil
Dean
Faculty of Forestry, University of Sopron, Hungary

SILVA NETWORK ANNUAL CONFERENCE
University of Sopron - 11-13 April, 2023

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[1] This paper is based upon a poster presentation, therefore, its subject does not closely reflect the main topic (communication and education) of the conference.

SUMMARY

According to NORBERT WEBER, chairman of the meeting and of the Silva Network, is Paul Watzlawick's famous quote "You cannot not communicate!" is still valid today. Especially forest owners and forest managers working in forests around urban agglomerations need to explain explicitly to the public what they are (not) doing, including *why* and *how* they do it. In some countries, the role of foresters as stewards for the ecosystem is increasingly contested. That is why graduates need to be equipped with the respective communication skills, including aspects of conflict management. Are higher education institutions in forestry prepared for that challenge? Should communication be established as a new discipline in the forestry curricula? And, in a wider sense, can forest pedagogy at schools help to arouse interest in forestry and to foster acceptance and trust towards forestry professionals?

Notwithstanding many presentations during the meeting in Sopron and notwithstanding the importance of the theme 'communication in forestry education', only four presentations and one poster were transformed into publications to be published in the SILVA Publication nr 20. Nevertheless, several important aspects of this theme and some additional papers are presented below.

The article 'The pedagogical and psychological benefits of forests - the importance of connection and communication' by KATALIN TÓTH-MERZA, TAMÁS HORVÁTH and ÉVA HARTL explores forest pedagogy, an interdisciplinary branch of environmental education that connects forestry and society through experiential learning in natural environments. Rooted in the motto "learning about the forests in the forests," forest pedagogy offers an innovative approach to education.

Forest pedagogy employs active and cooperative teaching methods, fostering cognitive, socio-emotional, and behavioural skills. It promotes creativity, cooperation, communication, interdisciplinary thinking, and environmental consciousness. With objectives encompassing education, social awareness, economics, and forest-related aspects, forest pedagogy shares knowledge about forest ecosystems, encourages responsible nature treatment, and raises awareness about sustainable forestry. It instils values such as respect for nature, solidarity among generations, and global thinking. Forestry schools in Hungary serve as vital platforms for forest pedagogy implementation, following strict certification criteria. At the University of Sopron, forest pedagogy is integrated into various faculties and a dedicated postgraduate programme.

In conclusion, forest pedagogy fosters environmental commitment, improves attitudes toward forestry, and enhances cognitive well-being. It acts as a crucial bridge, connecting society and forests for a harmonious coexistence.

In their paper 'Transforming scientific language into messages for the general public: communication and dissemination of a European RandD project in the field of forestry' SANDRA LIEBAL, JOSEPHINE KÖHLER, NORBERT WEBER address their experiences within a European RandD project. Between 2017 and 2022, the European RandD project Dendromass4Europe (D4EU) has been carried out. D4EU aimed at establishing sustainable, Short Rotation Coppice (SRC)-based, regional cropping systems with poplars for agricultural dendromass production on marginal land. The dendromass produced in the poplar SRC (ligneous biomass, bark and wood) has been used to develop innovative bio-based materials such as a functionally adapted lightweight board for furniture, eco-fungicidal packaging materials and bark-enriched wood-plastic composites.

Since the project has been funded by the Bio Based Industries Joint Undertaking (BBI JU) under the European Union´s Horizon 2020 research and innovation programme, the BBI JU´s ambitious objectives for a broad project communication and dissemination (C&D) had to be considered. But also, in general, C&D of scientific projects is meanwhile an important part of science communication. In D4EU, a multi-channel approach in connection with a multi-channel relational model for communication has been chosen to meet the demands of a good science communication. Referring to the experiences made throughout D4EU, this paper gives a brief overlook about the state of the art in strategic planning of communication and dissemination, summarizes some outcomes and results and highlights the lessons learnt. Furthermore, selected issues which occurred during the project C&D will be discussed in the scope of new requirements for science communication e.g., recent models of science communication and public relations.

Regarding higher forest education programmes, the evaluation of D4EU´s C&D has proven the high demands for a good communication about forests and forest-related topics on the one hand and indicated that there are often deficits in forestry education in this respect on the other hand. The paper thus aims not only to analyse the status quo, but also to reveal unused potentials and highlight future needs for addressing the topic of communication in higher forest education programmes to satisfy the increasing interest of the public in forests and trees.

BRIAN TOBIN, JULIE DOWSETT and TERRY BARRETT developed a manner to improve the learning activities of first year forestry students by involving them in teaching tree taxonomy to primary school pupils. They report about this experience in the paper 'Those who can't, teach! Harnessing experiential learning to motivate the study of botanical identification and ecological concepts'.

A lack of appreciation for tree species identification (dendrology) and understanding of ecological importance of trees/forests is likely to have considerable impact on society's capacity to address the climate change and biodiversity crises. This lack of

appreciation and awareness among the general public and schoolteachers, creates difficulties for professional forestry education at undergraduate degree stages which rely on this fundamental knowledge. The "dry" nature of learning in lab-based dendrology sessions about how to describe tree morphology and taxonomy for species-level identification has consistently been found to be a "hard sell" to first-year university students.

A problem-based-learning intervention was introduced as part of a dendrology module to motivate students to learn themselves by teaching small groups of primary school children in the "outdoor classroom". The flipped-classroom approach to teach younger children was an innovative gambit designed to build self-efficacy and motivation to learn among students. Students found the experience of giving guided tours "less scary" than anticipated and tended to enjoy preparing the tour. Overcoming the initial liminal uncertainty and discomfort in not knowing fully what was expected was less enjoyed. Ultimately, most students reported a positive experience and satisfaction in developing additional transferable skills and learning outside the classroom.

The forestry students JACOB RIEDEL, ANNE AUSTEN, JESPER HORST and KONSTANTINA FOTIADI demonstrate in their paper 'Do good and talk about it - but how? Communication as teaching term and value at the Department of Forest Sciences, Faculty of Environmental Sciences, TU Dresden, Tharandt, Germany' how communication is covered by the study programmes offered at the Department of Forest Sciences, Faculty of Environmental Sciences, TU Dresden, Tharandt. And how extracurricular activities enable students gain communication skills through learning by doing, as well as how the university groups practice communication at the Forest Sciences campus in Tharandt. For this purpose, the paper focuses on modules with teaching components on communication in the curriculum, internal and external communication by the university groups and the importance and benefits of communication in forestry in general. The authors' own experiences from various activities and involvement in university student groups as well as studying at the Tharandt campus served as a basis. In addition, an analysis of the university groups' social media channels helped us to visualise the reach of the communication. In particular, it was analysed how many people could be reached via the university groups' social media accounts in a one-day period. The following are the key messages of this paper: communication as part of the curriculum is present, but the coverage should be increased. Not communicating also constitutes a form of communication, which may lead to undesired consequences. A broad network of university groups can only function through communication and is at the same time a multiplier of internal and external communication. Communication is the key element of public relations and successful cooperation. It can be learned mainly theoretically in the curriculum and practically through involvement in extra-curricular activities such as university groups' activities. In a modern "VUCA" ("volatility", "uncertainty", "complexity" and "ambiguity") world, communication is the central tool for overcoming crises.

Therefore, more attention should be paid to the topic of communication in the forest sector and Forestry education.

BÁLINT HEIL and GÁBOR KOVÁCS introduce in their article 'Introduction of the faculty of forestry of the University of Sopron: higher education of forestry in Hungary is being renewed' the actual situation of forestry education at that university. While the period since the fall of the communist regime in Hungary in 1989 has brought many new challenges to our society, the Hungarian higher education system has continued to operate on an unchanged basis for a long time. The government has therefore introduced a new non-profit foundation maintainer model over the past two years. The University of Sopron (SOE) joined the group of Hungarian model change universities on August 1, 2020.

GYÖRGY CZIBULA presents in his paper 'Changes in the number of forest visitors in the Bakony region (Hungary) during and after the covid-19 epidemic waves[2]' his research on this subject. The Covid epidemic between the spring of 2020 and the summer of 2021 showed that there is an increasing demand for various forms of forest-related tourism. Number of visitors in forests broke records in certain places: 32 million visitor days were registered in 2020 in Pilisi Parkerdő Ltd. alone. In this article, data originated from the automatic visitor counters placed on certain forest lookout towers, are presented. Processing the data, insight of the number and distribution of hikers in each period can be obtained. As a result of the research, forest managers can learn more about the popular tourist destination, furthermore, knowledge is gained about the motivations and needs of forest tourism participants. Based on this, public welfare investments that meet real demands can be planned in a cost-effective manner. Ideally, the results achieved can bring satisfaction to all actors involved in forest tourism. On the demand (visitor) side, targeted and needs-tailored developments increase the experience factor of the time spent in the forest. On the supply (forestry) side, knowing the motivations makes the performance of public welfare tasks more efficient, which ultimately contributes to the improvement of the sector's image.

In any way, professionally dealing with communication is, according to NORBERT WEBER worth it. The contributions of SILVA Annual Conference in Sopron demonstrated that communication is not generally a neglected topic in higher forestry education. However, depending on the starting position of the particular institutions, continuous improvements or even new approaches are necessary. To end with a famous quote attributed to Jack Westoby: "Forestry is not about trees, it is about people".

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[2] This paper is based upon a poster presentation, therefore, its subject does not closely reflect the main topic (communication and education) of the conference.

THE PEDAGOGICAL AND PSYCHOLOGICAL BENEFITS OF FORESTS - THE IMPORTANCE OF CONNECTION AND COMMUNICATION

KATALIN TÓTH-MERZA, TAMÁS HORVÁTH, ÉVA HARTL

Abstract

This article explores forest pedagogy, an interdisciplinary branch of environmental education that connects forestry and society through experiential learning in natural environments. Rooted in the motto "learning about the forests in the forests," forest pedagogy offers an innovative approach to education.

Forest pedagogy employs active and cooperative teaching methods, fostering cognitive, socio-emotional, and behavioural skills. It promotes creativity, cooperation, communication, interdisciplinary thinking, and environmental consciousness.

With objectives encompassing education, social awareness, economics, and forest-related aspects, forest pedagogy shares knowledge about forest ecosystems, encourages responsible nature treatment, and raises awareness about sustainable forestry. It instils values such as respect for nature, solidarity among generations, and global thinking.

Forestry schools in Hungary serve as vital platforms for forest pedagogy implementation, following strict certification criteria. At the University of Sopron, forest pedagogy is integrated into various faculties and a dedicated postgraduate programme.

In conclusion, forest pedagogy fosters environmental commitment, improves attitudes toward forestry, and enhances cognitive well-being. It acts as a crucial bridge, connecting society and forests for a harmonious coexistence.

Keywords: forest pedagogy, certified forestry school, environmental education, postgraduate training programme

Introduction

The primary objectives of this article are to present forest pedagogy and to provide insight into forest pedagogy training at the University of Sopron, shedding light on the compelling reasons why it is regarded as an innovative communication bridge connecting the domains of forestry and society.

Concept of Forest Pedagogy

Forest pedagogy represents a distinct subset within the domain of environmental education, specifically focusing on qualified forest-related environmental education. At its core, the motto of forest pedagogy encapsulates its essence: "learning about the forest in the forest," emphasizing that the forest itself serves as the ideal and most authentic educational environment. Furthermore, forest pedagogy actively promotes and advocates for forests as both healthy and exceptional venues for outdoor education (Kováts-Németh and Földesi-Leskó, 2019; Anon, 2017).

Forest pedagogy is characterized by an interdisciplinary approach that applies and combines methods and knowledge from pedagogy and forestry. The main purpose of forest pedagogy in Hungary is to inform the society about the tasks and objectives of forestry, and to bring the society nearer to the forest environment (Györek, 2010; Hartl, 2020).

Furthermore, forest pedagogy aims to raise awareness of the fact that forests are not only pure nature, but also a cultural and an economic area, where people are constantly present. It demonstrates the possibility of a harmonious relationship between man and nature through the example of sustainable forest management with respect for nature, planned for the long term.

In Hungary, certified forest pedagogues, who are usually foresters with pedagogic knowledge and skills (and who are the most authentic people in the forest), provide education in forest pedagogy (Hartl, 2020; Horváth, 2016; Kollárová and Borisová, 2022).

Objectives of Forest Pedagogy

Forest pedagogy encompasses educational, social, economic, and forest-related objectives (Anon, 2017):

- Forest pedagogy shares knowledge about the forest ecosystem.

- It promotes treating nature with care, emphasizing responsibility and respect.
- Forest pedagogy raises awareness about the benefits of sustainable forestry.
- An essential facet of forest pedagogy is the communication of core values, including respect for nature, consideration for all living beings, responsibility, tolerance, solidarity across generations, and a commitment to global and long-term thinking and action.
- At the local level, forest pedagogy seeks to enhance relationships with the environment, promoting a harmonious coexistence between local communities and their natural surroundings.
- Forest pedagogy also aims to deepen understanding regarding forest management and the multifunctional advantages offered by forests.
- By advocating for the continued use of wood as a renewable resource, forest pedagogy seeks to foster social acceptance of timber harvesting and sustainable forest management practices.

Methods of Forest Pedagogy

Forest pedagogy represents an innovative approach to child education, grounded in forest-based play, providing an open environment for self-directed learning and discovery. This educational philosophy diverges from today's standardized methods of teaching and learning by accommodating the inherent needs of maturing children, encompassing activities such as physical movement, the pursuit of challenges conducive to neurological development, free play, and the formation of social relationships (Györek, 2010; Hartl, 2020).

Forest pedagogy utilizes experiential learning methods, requiring active and cooperative educational techniques and approaches. This includes activating methods and forms of learning by doing methods, and project-based learning. It not only transfers knowledge but also engages the emotional part of personality and supports practical skills and literacy (Kollárová, 2021).

These experiential learning methods improve cognitive, socio-emotional and behavioural skills and competences such as creativity and imagination, cooperative - and action - competences, communication skills, interdisciplinary thinking, curiosity, concentration, and social behaviour (Györek, 2010).

Certified Forestry Schools in Hungary

In Hungary, forestry schools are educational institutions providing the infrastructural and organizational background for forest pedagogy (Kováts-Németh and Földesi-Leskó, 2019). The country boasts over thirty state-owned and privately operated certified forestry schools. Each of these certified forestry schools has a forest area of two hundred hectares and is operated by a forest manager. Its primary objective is to encourage and facilitate the development of environmentally conscious and forest-friendly behaviours among both young people and adults. Forestry schools typically accommodate preschoolers and students, but they are also open to adult participants (OEE, 2022).

Forestry schools offer a diverse range of programmes, including lectures, presentations, guided tours, and practical classroom sessions, as well as camps and day-care activities. In addition to forest pedagogy, these programmes may encompass various cultural, sports, and leisure activities. The duration of these forestry school programmes can vary widely, from brief two-hour sessions to multi-day experiences. Among them, the five-day residential programmes, which combine forest pedagogy sessions with other leisure activities, represent an optimal and comprehensive offering (OEE, 2022). Over the past decade, over six hundred thousand children have enjoyed forestry school programmes.

It is noteworthy that forestry schools do not act as direct competitors to conventional schools and scientific educational institutions. Rather, they serve to augment and offer supplementary knowledge in an entertaining way engaging all senses.

Certification Criteria for Forestry Schools in Hungary

In Hungary, forestry schools go through a certification process that involves meeting specific criteria, particularly in the areas of communication and education. In the following section, we will briefly outline the key certification criteria for forestry schools in Hungary.

Material conditions (OEE, 2022)
- The forest area registered with the forestry authority covers at least two hundred hectares.
- The forestry school possesses the necessary demonstration and teaching tools and equipment to facilitate programme implementation.
- The forestry school prioritizes the safe and accident-free execution of its programmes, while also being adequately prepared to address potential

emergencies. This preparation includes accident prevention training, ongoing supervision, the provision of first aid equipment, and readiness for emergencies, such as the availability of medical professionals and ambulances as required (the presence of doctors and ambulances depends on the specific programmes).

Personal and organizational criteria (OEE, 2022)

- Forest pedagogy sessions and forestry school programmes are conducted by a forester or a forest pedagogue
- Leaders of forest pedagogy classes must regularly and verifiably (at least once a year) participate in the departmental meeting organized by the Forestry School Department of the National Forestry Association

Expectations of the forestry school programme (OEE, 2022)

- The certified forestry school is able to provide a forestry school programme throughout the year.
- The forestry school can adapt its programmes flexibly to the seasons and the weather.
- Forestry school programmes correspond to the age-related characteristics of the target groups.
- Forest pedagogy sessions take place in the forest.
- The minimum number of participants in the sessions is eight.
- At least sixty percent of forestry school programmes must consist of forest pedagogy sessions.
- The main topics of the forest pedagogy sessions are forests as a living community (knowledge of species, ecology); forests as a renewable natural resource; forests and human; relationship between forest and human health; sustainable forest management; the work of the forester.

Forest Pedagogy in the Educational Programmes of the University of Sopron

Forest pedagogy holds a prominent position within the array of training programmes offered at the University of Sopron, establishing the university as a central hub for its dissemination. This distinctive subject, forest pedagogy, is available in two university faculties: the Benedek Elek Faculty of Pedagogy and the Faculty of Forestry. Furthermore, the University extends its commitment to forest pedagogy by offering a dedicated Forest Pedagogy Postgraduate Training Programme. This programme delves into the core principles and applications of forest pedagogy, equipping participants with specialized knowledge, attitudes and skills in this interdisciplinary field.

In the following, we will outline the subjects and courses related to forest pedagogy offered at the University of Sopron.

Forest Pedagogy at the Benedek Elek Faculty of Pedagogy

At the Faculty of Pedagogy, forest pedagogy is included in the kindergarten educator BA programme. In this training programme, six consecutive subjects related to environmental education are integrated. At the top of the sequentially structured subjects of the education programmes stands forest pedagogy, which takes place in the fourth semester. The primary objective of the subject is attitude formation and knowledge expansion through lectures and outdoor seminars involving foresters. Throughout the course, students get knowledge about the forest and the forest management in a playful and experiential way. For many students, these seminars represent their first encounter with real foresters, marking a significant experiential milestone in their education (Hartl, 2020).

Based on our observations and experience, kindergarten educators who have participated in the forest pedagogy seminar tend to prioritize acquainting children with the forest environment and the role of the forester. Consequently, they frequently engage children in forestry school programmes. Central to this approach is the introduction of children to foresters and their work during forest pedagogy sessions, walks, and excursions.

Following forest pedagogy sessions, children are provided with opportunities to process their experiences through forest-centred games within the kindergarten. Additionally, children often share their newfound knowledge and experiences with their parents, fostering an increased interest in the forest environment among families (Hartl, 2020).

Forest Pedagogy at the Faculty of Forestry

Forest pedagogy and communication skills, as a subject, constitute an integral component of forestry engineering education. Over the course of the semester, students are introduced to fundamental pedagogical concepts, age-appropriate pedagogies, and experiential learning methods. They actively engage in practical field experiences, which include forestry school activities and museum pedagogy within a forestry school environment (Horváth, 2016).

The semester's requirements, initially unconventional for engineering students, encompass the completion of practical tasks, such as creating a forestry-centred fairy tale, undertaking project work, and compiling a collection of forest games (Horváth, 2016).

In the past decade, a diploma thesis focusing on forestry pedagogy has been produced each year. Additionally, the concept of forest pedagogy is integrated into the topics covered in the forest engineer state examination.

The significance and practicality of this course lie in its objective to shape students' attitudes and equip them with effective strategies for communicating forestry-related concepts to the broader public.

Forest Pedagogy Postgraduate Training Programme

The Forest Pedagogy postgraduate training programme received accreditation at the Faculty of Forestry of the University of Sopron around 2010. Over the past years, the university has welcomed more than 70 students.

Forest Pedagogy is a three-semester course open to both forestry engineers and teachers. In the first semester, the class is divided into two groups based on their degrees. Engineers delve into the fundamentals of pedagogy and psychology, gaining insights into children's cognitive, emotional, and behavioural development, as well as characteristics of developmental periods, group dynamics, and project pedagogy. The objective is to equip them with the skills to effectively engage, instruct, motivate, and communicate with children. Concurrently, teachers acquire basic knowledge in forestry, forest management, and wildlife management (Horváth, 2016).

During the second and third semesters, the paths of educators and engineers converge, and they engage in shared coursework, particularly in specialized forest pedagogy subjects. These include forest pedagogy, forest pedagogy projects, the fundamentals of forestry school programmes, and sectoral policy. Field practices take place at the Forest Enterprise (TAEG) Ltd., serving as the practical training ground for students (Horváth, 2016).

Upon successful completion of the programme, engineers are conferred with the title 'Engineer specialized in forest pedagogy,' whereas educators are granted the designation of 'Expert in forest pedagogy'.

Conclusions

Forest Pedagogy serves as a unique bridge connecting two seemingly distinct university faculties: forestry and pedagogy, fostering an interdisciplinary approach that combines their collective knowledge. This innovative field creates a fresh communication channel between forestry and society, effectively bringing nature closer to people and bringing people physically to nature.

Its significance lies in its ability to nurture environmental commitment and the adoption of environment-protective behaviours. Furthermore, forest pedagogy fosters a deeper understanding and raises the interest of the general public in forestry, cultivating a more positive attitude toward forest management. Ultimately, it encourages individuals to view the forest as a renewable resource rather than an untouchable sanctuary. Additionally, exposure to nature through forest pedagogy has a positive impact on cognitive functioning and psychological well-being, benefiting both children and adults alike.

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TRANSFORMING SCIENTIFIC LANGUAGE INTO MESSAGES FOR THE GENERAL PUBLIC: COMMUNICATION AND DISSEMINATION OF A EUROPEAN RANDD PROJECT IN THE FIELD OF FORESTRY

SANDRA LIEBAL, JOSEPHINE KÖHLER, NORBERT WEBER

Abstract

Between 2017 and 2022, the European RandD project Dendromass4Europe (D4EU) has been carried out. D4EU aimed at establishing sustainable, Short Rotation Coppice (SRC)-based, regional cropping systems with poplars for agricultural dendromass production on marginal land. The dendromass produced in the poplar SRC (ligneous biomass, bark and wood) has been used to develop innovative bio-based materials such as a functionally adapted lightweight board for furniture, eco-fungicidal packaging materials and bark-enriched wood-plastic composites.

Since the project has been funded by the Bio Based Industries Joint Undertaking (BBI JU) under the European Union´s Horizon 2020 research and innovation program, the BBI JU´s ambitious objectives for a broad project communication and dissemination (CandD) had to be considered. But also, in general, CandD of scientific projects is meanwhile an important part of science communication. In D4EU, a multi-channel approach in connection with a multi-channel relational model for communication has been chosen to meet the demands of a good science communication.

Referring to the experiences made throughout D4EU, this paper gives a brief overlook about the state of the art in strategic planning of communication and dissemination, summarizes some outcomes and results and highlights the lessons learnt. Furthermore, selected issues which occurred during the project CandD will be discussed in the scope of new requirements for science communication e.g., recent models of science communication and public relations.

With regard to higher forest education programmes, the evaluation of D4EU´s CandD has proven the high demands for a good communication about forests and forest-related topics on the one hand and indicated that there are often deficits in forestry education in this respect on the other hand. The paper thus aims not only to analyse the status quo, but also to reveal unused potentials and highlight future needs for addressing the topic of communication in higher forest education programmes in order to satisfy the increasing interest of the public in forests and trees.

Introduction

During the last decades, the amount of communication and the way in which is communicated on topics related to forestry have changed significantly. In the past, scientific knowledge about forests, their growth, functions, management and utilization was often exclusively written for and used by trained forest workers or studied foresters. Due to crucial changes in society and environment (e.g. industrialization, globalization, climate change), the public´s interest in forests has increased and their perception of forests has been diversified (Rametsteiner *et al.*, 2009; Farcy *et al.*, 2019). In addition to timber production, the ecological, carbon absorbing and recreational functions of forests are considered highly important by the majority of laypersons in large parts of Europe nowadays (Eisele and Juschka, 2022; Kleinhückelkotten *et al.*, 2009; Farcy *et al.*, 2019). These developments are also reflected in the communication about forests, which has undergone a massive development: Starting with the diversification of the communication activities (e.g. use of digital and web-based channels, forestry education, production of audio-visual formats) and communicating institutions (e.g. state forestry organizations, forest-related NGOs, universities, companies in the forestry and timber sector) the communication in the field of forestry has been more and more adjusted to the rules of social marketing, public relations, storytelling and even to persuasive communication (Dobler *et al.*, 2016; Matagne and Fastrez, 2019; Fähnrich *et al.*, 2023). However, the wicked situation of an increasing demand for wood in times of bioeconomy on the one hand and the more frequent demands for larger forest areas for nature and climate protection on the other hand has not significantly improved so far. In recent years, scholars of forestry, environmental and science communication therefore search for optimized communication solutions in order to avoid new or solve existing conflicts.

This paper gives a brief overlook about the state of the art in strategic planning of communication and dissemination (CandD), summarizes some evaluation results and highlights the lessons learnt. Furthermore, selected issues which have been occurred during the project CandD will be discussed in the scope of science communication.

Communication subject and objectives

Between 2017 and 2022, the European Innovation Action – Demonstration (IAD) project Dendromass4Europe (D4EU) has been carried out and led by the Technische

Universität Dresden (https://www.dendromass4europe.eu/). D4EU aimed at establishing sustainable, Short Rotation Coppice (SRC)-based, regional cropping systems with poplars (Populus spp.) for agricultural dendromass production on marginal land or on currently unused agricultural land. The poplar SRC were not only ought to exploit the potential of underutilized land for sustainable production. The poplar dendromass produced (ligneous biomass, bark and wood) has been used to develop four innovative new bio-based materials such as a functionally adapted lightweight board for furniture, eco-fungicidal packaging materials and bark-enriched wood-plastic composites. Thus, D4EU pursued the goal of strengthening the European bioeconomy.

Connected to SRC establishment and operation, efficient harvesting and log storage methods had to be explored and tested. Furthermore, a dedicated monitoring and applied-level research had been implemented to ensure optimal poplar clone selection, plantation growth and quality and production stability. A comprehensive biodiversity monitoring and life cycle assessment validated the expected positive ecological impacts. These manifold objectives of Dendromass4Europe show the complexity of the project, ranging from land acquisition, land (re)utilization with poplar SRC, processing of poplar dendromass into bio-based materials, value chain establishment up to customer-ready products and their market application.

In addition to these content-related goals, the project included a separate work package for communication, dissemination and exploitation. This work package has been responsible for external and internal communication. External communication aimed at

- informing about the project activities and results to different target groups,
- providing knowledge to the general public about how poplars, poplar plantations and poplar dendromass can contribute to a sustainable bioeconomy,
- raising awareness about the need of strong European bio-based industries,
- promoting the new bio-based materials developed by D4EU and their added value for ecology, society and economics,
- and supporting the transition of land use.

The internal communication has been supported by fostering the collaboration and dialogue between the D4EU project partners and by assistance with manifold activities (e.g. provision of key messages and keywords, preparation of publication materials, organization of events).

Strategic planning of communication

Communication in and about scientific projects is meanwhile common and there is a bunch of literature about how to do this (e.g. Dow and Taylor, 2008; Morozzi, 2018). However, a number of these guidebooks are still stuck in an old perspective of what the roles of communication sender and recipients are (see 'deficit model' later in that paper) (Freitag, 2016: 28). The addressees are seen as a passive mass whose knowledge deficit must be eliminated by the intensive supply with information (Davies *et al.*, 2009; Bucchi and Trench, 2014; Metcalfe, 2019). It has been discussed a lot, that this view is no longer up to date, where science is seen as a part of society and "increasing intersection and permeability of boundaries between science and society" occur (Bucchi and Trench, 2014: 2). Literature about project communication which are based on the dialog or on participatory models have mainly appeared in recent years - after the start of the D4EU project (SiS.net, 2020; Ahamer, 2022). These scholars not only highlight the two-way communication and the active role of recipients, similarly to publications about science communication. They also consider the special requirements of communicating in and about scientific projects. To give an example, both Ahamer (2022) and SiS.net (2020) cite an illustration of the European Innovation Council and SMEs Executive Agency (EISMEA) on "how to communicate your project" (see Figure 1).

Besides the important recommendations to e.g. "link communication to hot topics in society" and to "understand media language and needs" they also explicitly mention that projects have to "build [its] brand" (EISMEA, see Figure 1). That means, that the strategic planning of project communication must also take account of promoting the project as a scientific entity. As long as research funding is often based on projects, the visibility of and awareness about the project is crucial for the viability of scientific institutions. Therefore, it is not enough to just tell people about the activities and outcomes of a project and provide project results to specific stakeholders. You also have to promote the project consortium and defend your scientific background, topics and visions in order to be considered by funding organizations in future. Keeping this in mind, the "branding" of D4EU was one important issue during strategic planning of communication. As a part of this, an own Corporate Design (e.g. logo, colours, fonts, style elements, templates) had been defined at the very beginning of the project in order to maximize the recognition value of D4EU.

Following the advice of "think, plan, act strategically" (EISMEA, see Figure 1) a communication strategy was set up at the beginning of the project. According to the purpose and rules of project communication planning, which Magezi *et al.* (2021: 1476) consider "as the process of determining project stakeholders, their information needs and then coming up with a communication approach", the D4EU communication strategy compiled who (sender), why (objectives), what (key messages), how (style and tone), where (communication channel) and to whom (target

audiences) communication was to carry out (see Morozzi, 2018: 99). Considering the many different project objectives, the formulation of messages is particularly crucial. A didactic reduction and the strong focus on key messages help a lot to avoid getting lost in too many storylines.

In the following, we would like to highlight two questions of the D4EU communication strategy: how and to whom.

How: thoughts about intended style and tone of communication

In view of the style and tone of the project communication and dissemination (CandD), we defined it to be factual (as opposed to rely on emotional wording)

Figure 1: Recommendations of the European Innovation Council and SMEs Executive Agency (EISMEA) for strategic planning of project communication. Source: https://eismea.ec.europa.eu/manage-and-communicate-your-project-grants_en.

and positive (as opposed to problem-based). Special emphasis was laid to the avoidance of technical language and scientific jargon. As far as possible, easy language or plain language was preferred in order to make the messages more accessible and comprehensible (Hansen-Schirra and Maaß, 2020: 17; Korcz *et al.*, 2022). However, this opened the tightrope walk between scientific precision and complexity on the one hand and popularization on the other (Bell and Turney, 2014; Matagne and Fastrez, 2019). Just to mention one example: Is it better to use

'plantation' instead of 'short rotation coppice'? For sure, the word plantation is more common and thus better comprehensible. However, due to environmental problems caused by intensive plantation farming, the term 'plantation' is often perceived negatively. According to Rowan (1999, cited after Peters, 2014: 75) it would be helpful to explain the scientific term "making the contradiction between everyday knowledge and scientific knowledge explicit". In D4EU, we therefore periodically published articles explaining the two terms and pointing out the differences. In addition, we took advantage of the multi-channel approach (Spenst and Gronau, 2022): In linguistically simple texts in which the word 'plantations' was used, we referred or directly linked to more complex texts in D4EU media (e.g. via shoutouts). Thus, we offered a more detailed information to all recipients who were triggered by the word 'plantations'.

To whom: definition and description of the publics[3]

According to the frequently stated requirement of a precise compilation and description of target audiences, the D4EU communication strategy also depicted a number of many target audiences, who must be addressed in order to achieve the manifold communication objectives. Only considering the external publics, the target audiences still were very diverse, ranging from lay people, farmers and landowners, authorities and administration municipalities, politicians and manufacturers, customers, environmental NGOs to scientific communities. Knowing about the issue of target-group-specific communication, we chose a multi-channel approach (Spenst and Gronau, 2022: 415ff). This included for instance a project website, social media accounts, printed materials, panels, press releases, video clips, demonstration events, stakeholder workshops, publications (public press to peer-reviewed), conferences as well as television and radio contributions. Multi-channel communication uses both digital and analogue channels, which exist as mutually independent but in a synergetic way and which offer the possibility of an interaction (Spenst and Gronau, 2022: 416). This implies that the same information can be provided via several communication channels, but the wording (and even the scope of information) may differ.

A strategic CandD planning not only lists diverse target groups, it also strives to describe these groups with regard to their socio-demographic features, perceptions, interests and preferred way of getting informed. For this, we applied the persona method (Lepzien and Lewerenz, 2017; Schweibenz, 2019). Based on the multiple

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[3] "Publics has become a common term in discussion and study of science in society, indicating in shorthand that the public is diverse, even fragmented. […] Adopting the plural form was an important part of recognising that generalisations about the public – specifically in terms of its deficits – are very rarely valid, and often seriously misleading (Einsiedel, 2000). Referring to publics has been associated with the proposal of a contextual model of communication, according to which the communicators inform themselves about, and are attentive to, the various understandings, beliefs and attitudes within the public" (Bucchi & Trench, 2014: 6).

communication channels and precise target group descriptions we assigned the different audiences to specific communication channels in order to set up a multi-channel relational model. The decision was mainly based on what their average prior knowledge is, what kind of information they are interested in and which communication channels a group preferably uses. Hence, literature and surveys analyzing the media consumption of different publics (e.g., SevenOne Media, 2005; GIK, 2018 and 2020) have been an important source for communication planning of D4EU, especially those addressing relevant media for keeping people informed about forests (Kleinhückelkotten *et al.*, 2009; Gaggermeier and Eisele, 2022; Füller and Krüger, 2019). Table 1 summarizes the preferred communication channels for the different expected levels of prior knowledge.

Table 1: Level of knowledge of different target audiences and preferred communication channels and tools – the multi-channel relational model of D4EU.

Low level of knowledge: General public, consumer	Mid level of knowledge: Politicians, Media, Investors	High level of knowledge: Scientists, reviewers
Website	Website	Website (esp. downloads section)
Leaflets, general poster, Roll-ups	Leaflets, general poster, Roll-ups	Scientific publications
Public press	Conferences	Conferences
Social media	Social media	Technical posters
Video clips / YouTube	Video clips / YouTube	Workshops
Exhibitions	Demo events	
TV and Radio spots	Technical posters	

Realization and outcomes of CandD in D4EU

During the five and a half years D4EU was running, there have been hundreds of activities. One can imagine that it would go beyond the scope of this paper to describe all these activities in detail. Thus, only very limited examples of what has been done when and where shall be presented here[4].

The first half of the project has been especially used to provide information and communication materials such as press releases, leaflets, posters, roll-ups and information panels for local residents and visitors of the poplar SRC, which have been

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[4] For a more detailed report, please see the public deliverables 'D6.3 Dissemination and Communication Report (M1-M30) and Plan for M31-M60' as well as 'D6.4 Dissemination and Communication Report (M31-M66)', both available in the download section of the D4EU website: https://www.dendromass4europe.eu/.

installed at two highly frequented paths along the poplar SRC. Relevant communication channels like a project website and the social media accounts on Facebook, Twitter and ResearchGate have been launched within the first six months. Of course, all these communication tools have been continuously updated or exceeded if possible.

In the second half of the project (months 31 – 66), special emphasis was laid to the provision of expert knowledge through scientific publications and technical posters and to the production of video clips as communication tools. Furthermore, the focus of CandD has switched from providing dissemination materials to an active communication enabling an open discussion and encouraging dialogue. Due to the Covid19 pandemic, most of these activities were cancelled or had to take place online unfortunately. Many of the planned live or face-to-face events like conferences, stakeholder workshops and scholar colloquiums have not taken place or have been postponed. To nevertheless enable a two-way communication, we intensified our presence on social media and contacts to journalists.

In sum, over 200 CandD activities have been realized by the project consortium. Excluding website and social media, these activities have reached over two million people (see Table 2). Website and social media outreach have been excluded because it was impossible to make at least a profound estimation of the number of reached people. Due to strict data protection rules we were not allowed to implement a visitor tracking at the website.

Table 2: Outreach of the dissemination and communication activities during D4EU runtime according to the numbers counted in the project management table, excluding website and social media accounts.

Target audience	Number of persons reached
General Public	1,819,055
Scientific Community	90,966
Industry	85,299
Civil Society	35,760
Customers	19,143
Other	18,748
Policy Makers	7,276
Investors	5,613
Media	3,430
All together	2,085,290

The target group we were able to reach most often was the general public (> 1,8 million people, see table 2), mainly due to some well recognized TV and radio spots

as well as press articles. With more than 91,000 people, the scientific community ranked second, mainly caused by numerous conference participations and the often-read technical posters. The third largest target audience has been business and industry (> 85,000 people), which have been especially addressed by some of our videos, by the cooperation with communication projects like BioVoices and BioBridges as well as project presentations at fairs and booths.

Discussion of CandD results

Although much of the important literature about science and project communication and strategic communication planning was published after the project started, most of the tasks have been carried out in line with the now existing guidelines and recommendations.

The scope of models of science communication

Scholarly communication has always been a fundamental characteristic of universities. However, universities – including those offering higher forestry education programmes – today have to expand their communicative function beyond teaching and research. The so-called third mission strives for knowledge provision and competence training for the public (Bucchi and Trench, 2014: 5; Spenst and Gronau, 2022: 412). Higher forestry education thus cannot rely on teaching prospective foresters, it also has an educational mission for society, too. The question arose, how this mission can be fulfilled successfully and how communication should look like in order to make forestry sciences tangible and experienceable. What are the appropriate means, media and activities to ensure that civil societies can understand and interpret research approaches, methods, results and backgrounds and allay fears about technical, medical, and social fields of research? With this regard, the theoretical models of science communication have been discussed, too, and preferences have been changed from the deficit to a participatory model (Davies *et al.*, 2009; Salmon *et al.*, 2017; Metcalfe, 2019).

In the deficit model, "the public was viewed as an empty vessel, an audience waiting to be filled with a collection of authoritative scientific facts" (Davies *et al.*, 2009: 338). Typical objectives of a science communication based on the deficit model include awareness raising, information provision, eradication of superstitions and misconceptions, ensuring public support and funding, increasing trust in science and scientists, improvement of decision-making, changing of behaviour and attitudes as well as the promotion of a particular scientific institution or organization (Metcalfe, 2019). Comparing this list with the objectives for CandD of D4EU given above, it can be recognized that all of them have been implemented. Metcalfe (2019) further analysed in her research, which communication activities are most often used to address these communication objectives. Table 3 provides a list of those typical

communicative means of the deficit model and shows, which of them have also been carried out in D4EU. From this it can be noticed that D4EU has applied almost all typical means of deficit-style communication. This is consistent with the finding of Matagne and Fastrez (2019: 173), that "this model is the one favoured by the players in the forestry world".

Recognizing, that lots of efforts in deficit-style communication often were not able to reach their goal, critique on this model arose. Researchers became aware, that the "publics' relations with science were much more complex than the deficit model suggested" (Davies *et al.* 2009: 338). In line with a constructive perspective on information processing, addressees actively handle scientific information (Freitag, 2016; Matagne and Fastrez, 2019; Farcy *et al.*, 2019). For instance, it must pass the selective filters of individuals which are based on prior knowledge, frames and representations, social aspects as well as personal features and needs (Liebal, 2011). Even if an information has passed the filter, individuals deploy different coping strategies to avoid cognitive dissonances and to create or retain a sound representation of reality (ibid: 31). Thus, publics are far from being empty vessels and scientist realized that communication has to be based on the individuals´ characteristics. That means, that you first should ask about the interests and needs of recipients and that science communication has to accompany the information processing and framing by initiating a dialogue. Davies *et al.* (2009: 341) take a similar perspective when they say: "Dialogue events can thus be viewed as sites of individual learning through social processes".

Table 3: Comparison of Communication activities referred to the deficit model of science communication, listed by Metcalfe (2019: 10), and realized CandD activities of D4EU.

Communication activities referred to the deficit model of science communication, listed by Metcalfe (2019: 10)	Status, whether this activity has been applied in D4EU
Produce a publication	Yes
Orally present science (one-way communication from someone/ media to audience)	Yes
Use traditional means of mass media – print, TV, radio to engage	Yes
Provide an award to people	No
Put up a display/exhibit	Yes
Have a promotional strategy/campaign	Yes
Use formal educational means to engage	Yes, to a very low extent
Use online means to communicate including website, social media	Yes
Hold some type of event/show/meeting	Yes
Compete for a prize	Yes

According to Metcalfe (2019: 3), science communicators applying the dialogue model are "prepared to engage in a dialogue with the public to help explain the science […], listen to and consult the public about their perceptions, concerns and needs […] and acknowledge that the public may have useful knowledge that can help scientific progress and policymaking". Typical "objectives of dialogue-style communication are to address growing mistrust of science, discover public opinion about contested science […], gain and use lay knowledge to complete scientific knowledge, debate or discuss scientific/technological issues and acknowledge uncertainties of science, facilitate interdisciplinary approaches by making connections between people, be more accessible and accountable to the public [and to] engage citizens more democratically in science and technology issues, including making decisions and formulating policy" (ibid: 4). Looking at these features and objectives of a dialogue-style communication, D4EU had good intensions and rudiments. Scientists had been prepared and curious for a dialog. We really aimed to discover public opinions and indeed collected "lay" knowledge by surveying the thoughts and positions e.g. of farmers and landowners, of local residents and customers (Ranacher *et al.*, 2021; D4EU Deliverable 3.6 "Customer Survey"). Additionally, communication on social media or at the demo events enabled a two-way communication. We addressed growing mistrust of science e.g. by writing letters of intention to the nature conservancy agency and discussing uncertainties with regard to possible environmental side-effects of poplar SRC. But we did not allow citizens to influence decisions or set agendas. Summarizing what really happened during the project runtime, there has been the intention to get into a dialog, but the feedback was rather scarce and the dialogues mainly short. This might be due to the fact, that there have been only a few communication activities focusing on dialogue as figured out by Metcalfe (2019) (see Table 4). But to a certain extend it also may be a normal experience, that sometimes publics do not participate in dialogs (Metcalfe, 2022). As suggested by Sis.Net (2020: 7), a citizen science task, a science café, participation in science festivals or a more stimulating campaign in online interaction would have been appropriate means to foster feedback from the publics. However, the Covid19 pandemic has nipped thoughts of planning such activities in the bud.

The "participatory model of science communication […] recognizes and acknowledges various public as being equal with scientists and policymakers in reflecting upon, sharing knowledge about, creating new knowledge (which has also become known as 'knowledge co-production') and making decisions about science that affects society" (Metcalfe, 2019: 4). This clearly includes a shift in power from science to public. Communication in the participatory model serves to learn collectively, to produce knowledge and solve problems jointly, to participate in policymaking together with various publics and to let publics shape the scientific research agendas (ibid). The focus of typical communication activities (e.g. "lay people participate with scientists in an activity" or "lay people collect data or actually do research" (Metcalfe, 2019: 10)) no longer lays on communication but more on co-

creation or co-production and practical involvement (Sis.Net, 2020: 4; Salmon *et al.*, 2017: 53). In D4EU, neither were these activities intended nor did they happen.

Table 4: Comparison of Communication activities referred to the dialogue model of science communication, listed by Metcalfe (2019: 10), and realized CandD activities of D4EU

Communication activities referred to the dialogue model, listed by Metcalfe (2019:10)	Application in D4EU
Have an activity that involves people in science/with scientists	No
Give people access to science, scientists, science resources	Yes (e.g. website OA-publications, demo events)
Train/help develop people's skills so they can communicate better/participate in science	No (training only for certain scientists within D4EU)
Hold a workshop	No (workshops only for scientists, not for lay people
Bring people together into a network	Yes
Discuss science or scientific issue	Yes (e.g. on social media, meetings with representatives and stakeholders
Bring together people from different disciplines or areas to work together	Yes, on the scientific and operational level
Research/find out about people's opinions and needs to better engage/communicate with	Yes, by scientific and informal surveys

As a conclusion, D4EU mainly referred to the deficit model but included several communication activities which belong to the dialogue model. This is in line with the findings of Metcalfe (2022), that in practice projects often take a pragmatic approach and adopt parts of each model. She also claims, that "there is nothing inherently wrong with deficit-style science communication, especially if we talk about it as 'transmission-style', where information is transferred, often in response to publics´ demand" (ibid: 6). Furthermore, "participation needs dissemination and dialogue techniques" (ibid: 5). Communication activities based on the deficit and dialogue model can thus be considered as important preconditions of participation.

The scope of working with journalists as mediators

As already revealed above, TV, radio and public press are still widely used by lay people to obtain information. As a result, even today it should be of high priority for project communication to present a research project in TV, radio or public press. Of course, this also applied for D4EU and we successfully managed to showcase the project in two newscasts in TV and one radio spot. However, these communication channels mainly cannot be entered directly. Instead, you are dependent on (science) journalists, bringing the story out. "Despite the growing importance of direct communication by scientists, scientific organizations and scientific media, journalism is still an important public mediator of scientific expertise" (Peters, 2014: 76). This

can become a challenge for CandD in a forest-related project for several reasons, only a few of which are highlighted below.

"Science journalism […] seeks to hang stories on traditional news pegs, characteristics of real-world processes that are proven audience attention-getters. Among those pegs are characteristics such as timeliness, conflict and novelty" (Dunwoody, 2021: 19). With regard to novelty, journalists tend to wait until a certain milestone is reached (e.g. publication is out, product is ready) instead of showcasing the long-lasting processes and (scientific) methods on its way. This can be especially challenging in the early stage of a project, where reached milestones are rare. In addition, "[media] coverage of the issue will erupt only when 'something happens' in a journalistic sense", meaning that media coverage depends on the "presence or absence of pegs" (Dunwoody, 2019: 20). For D4EU, this caused a tricky situation. On the one hand, we were able to take advantage of the fact, that forests are a persistent news peg in Europe (Matagne and Fastrez, 2019: 168). On the other hand, in case journalists were interested in D4EU because of the forest-related topic, we first had to explain that short rotation coppices (SRC) are not a forest but an agricultural cropping system in order to be scientifically accurate. Doing so, it has been confirmed that the time resources of journalists are very limited (Peters, 2014: 77) – this time with a positive result. Hence the journalists have spent their time to visit D4EU´s places (e.g. university laboratories, poplar SRC), they decided to not waste this time and produce their story nevertheless. Thus, we would like to repeat the recommendation of EISMEA (see Figure 1) to link project communication to hot topics in the society.

As another challenge for CandD, journalists are mostly dependent on the rapid pace of the production infrastructure a content has to pass (Dunwoody, 2021: 19). If the production conditions do not fit at the moment the journalist is interested in the project, the window of opportunity is quickly closed. In D4EU, we have struggled with that point for several times: When the poplars had no green foliage, the journalists did not want to film there and thus the story was not produced. At a later stage of the project, it was very helpful to provide own high-quality takes to journalists for their free use in such situations.

A third challenge with regard to science journalists refers to the question whom journalists select to be the cited expert. Peters (2014) pointed out to some important research results. For instance, "experts representing minority positions are usually over-represented in the coverage, […] media tend to select expert sources that support their editorial policies [and] media focus on few visible scientist […] (ibid: 76). He further argues that "the main journalistic criterion in the selection is whether a source makes a good story or improves a story" (ibid) and that "journalists prefer scientists who are able and willing to speak crisply and concisely, to answer the questions asked and to explain complicated matters using comparisons and metaphors, and those who draw bold conclusions. Furthermore, journalists prefer scientists with high

organizational rank and public reputation and who are, in that sense, media appropriate" (ibid: 77). Lacking an already visible scientist within the D4EU consortium, we spent much efforts to at least fulfil the journalist´s preferences for scientists speaking crisply and concisely by preparing requested issues very carefully, as well as for being comprehensible by using plain or easy language. We also tried to foster visibility of some D4EU scholars e.g. by successfully applying as a #BioHeroes – an expert panel in the field of bioeconomy founded by the H2020 communication project BioBridges. Whether these investigations have been successful has not been scientifically evaluated. However, in view of being contacted by journalists repeatedly and more frequently during the course of the project, we assume that it paid off.

The scope of social media

Using social media for CandD of scientific projects like D4EU is a rather new phenomenon. However, since social media have become established communication channels to provide scientific information (one-to-many communication) and discuss scientific topics (many-to-many communication) (Fähnrich, 2021; Schäfer, 2017), social media can be seen as an important way of project communication (Schäfer, 2017).

A bunch of literature exists examining the advantages and risks social media offer for science communication. On the positive side, social media enable to provide timely and boundless information, which can be accessed from anywhere, enable interaction und are usually free of charge (Schäfer, 2017: 277). For scientists, being present on social media also enables to participate in the online debates carried out in the accounts of the established mass media (e.g. TV and radio stations, newspapers). Schäfer (2017: 280) points out, that mass media and their online presences are increasingly important actors, points of reference and crystallization of online science communication in many countries.

On the other hand, social media lack a journalistic quality management and lay people often struggle to distinguish correct from false information (ibid: 288). Meanwhile, there is an increasing amount of fake news and deep fakes circulating in social media and contents can be produced by artificial intelligence (Spenst and Gronau, 2022: 426). Furthermore, the platform´s algorithms "offer a personalized diet of news" (Fähnrich, 2021: 2) and can thus foster fragmentation of publics. Social media platforms are often characterized by an own language and image style and by the use of special features like hashtags, emojis and reals. EISMEA (see Figure 1) therefore recommends to get into the media mindset in order to be successful on social media. Connected with the fact that providing information about scientific topics is not restricted to scientists in social media, this can lead to content on online media deviating from the scientific state of affairs (Schäfer, 2017: 281). Schäfer (2017: 282) further states that discussions on social media as well as blogs are often unstructured,

polarized and ideologically driven. They include „high numbers of controversial and uncheckable assertions" and the "tone of content is often 'uninspiring' and can in places descend to playground level" (Gavin, 2010: 469).

Keeping these negative aspects of social media in mind, the question arises how much effort should be spent when communicating and disseminating scientific projects. Of course, this question cannot be answered unequivocally in this paper. Instead, we would like to highlight and discuss some outcomes of the social media work within D4EU.

Being present with D4EU on social media was rather time consuming. Most time has been spent for preparation of posts, covering the whole process from topic selection, wording, image selection and editing, tagging and – in some cases – scheduling the posts. However, this conclusion also takes into account that social media work not only consists of preparing, posting and sharing information but also of screening the newsfeeds, answering comments and direct messages and managing followers. This finding is in line with literature discussing the change of roles and perspectives which scientists occupy in social media (Fähnrich, 2021: 3; Spenst and Gronau, 2022: 420). Science communication in social media is characterized by blurring lines between the roles as sender and audience. Scientists are now both producer and consumer of news. Seriously analysing this reciprocal news management, it must be acknowledged that this receiver role has also influenced CandD work within D4EU. For instance, it has affected news selection (e.g. when some hot topic occurred) and wording (e.g. in case of retweets or post sharing). With this regard, the dedicated social media strategy was most helpful in order to not getting lost in ad-hoc communication. The strategy forced us back on spreading our key messages and focusing on all relevant target audiences.

The outreach of D4EU´s Twitter account was much better than the success on Facebook in terms of followers and reads[5]. The missing community within the D4EU consortium on Facebook sharing our posts might have been a relevant factor. However, this also applied for Twitter at the beginning of D4EU and here, the outreach was more satisfactory. We assume two reasons for that. First, much more other actors (e.g. other BBI-funded projects, politicians, scientists, NGOs, industrial stakeholders) relevant in the scientific fields of D4EU have been active on Twitter compared to Facebook. Thus, networking and setting up a kind of community or interest group was easier and resulted in more shares of posts. Second, since hashtags play an important role on Twitter while are rarely used on Facebook, the use of hot-topic-hashtags increased outreach significantly.

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[5] Maximum number of followers on Facebook = 148 and on Twitter = 401. Maximum Outreach of a single post on Facebook = 552, on Twitter = 5691.

In view of the different models of science communication and with regard to the vision of encouraging a shift from deficit to dialogue model, the Facebook account was not very successful. Of course, there have been some interactions such as following us, giving likes and sharing of posts. Spenst and Gronau (2022: 415) interpret these actions as engagement of the public. However, our posts were rarely commented. Even posts asking for visitors' opinions went largely uncommented. Thus, we were not able to establish a dialogue. The communication mainly stayed one-way. On Twitter, our posts often have caused our profile to be visited. In addition, about half of all our own posts were retweeted or cited. Thus, the amount of interaction on Twitter was much higher and so was the engagement of the public. However, commented tweeds as first step to a many-to-many communication and direct messages opening a one-to-one dialogue on Twitter have been rare. Summarizing the communication on Twitter, it can be stated that there was not really a dialogue but at least a two-way communication.

A discussion about outreach in social media should also consider the fact that there are millions of news items every minute and addressees are forced to avoid an information fatigue. Thus, forestry-related topics such as the issues of D4EU compete with other topics for a place in media (Kleinhückelkotten *et al.*, 2009: 82). A common strategy to maximize the chance of being heard is to produce and multiply "shorter messages that have lost the detail needed to form a context of interpretation" (Matagne and Fastrez, 2019: 174). In D4EU, there has been the conscious decision to sparsely use such superficial messages, because we did not want to perceive our publics as an empty vessel which is not able to make sense of scientific information. Where popularized messages were used, the posts usually included a link (e.g., to longer texts at D4EU website) or shoutout to nonetheless explore the statement in more detail and to make contents checkable. Another strategy to circumvent the audience's avoidance mechanisms is to produce messages that primarily aim to evoke emotion and consternation. Often, these messages are characterized by persuasive communication, negative events and crisis and by suggestive questions designed to arouse curiosity (Rogan and Hammer, 1995: 558; Kleinhückelkotten *et al.*, 2019: 82; Matagne and Fastrez, 2019; Liebrecht *et al.*, 2019). Following our own experiences in education and communication as well as the recommendation of Matagne and Fastrez (2019: 177), that forestry communication should "consider alternatives to persuasive communication […] (i.e., communication that recognizes the active role of audiences in the co-construction of the meaning of media messages)", we focused on an informational and deliberative tone of communication – also in social media. Furthermore, we did not support the widespread practice of using negative sensations for our own news due to the wish to avoid depressing messages. In view with our communication strategy, we rather wanted to use an inspiring, motivating and empowering tone of communication and stress an "educational approach to communication" (Matagne and Fastrez, 2019: 177).

In retrospect, our conscious decisions to sparsely adopt common marketing-based strategies of maximizing communication outreach might have been one reason why the numbers of followers and reads of D4EU´s social media accounts aren´t that high. It is a pity that the social media work of D4EU was not able to significantly contribute to creating dialogue. However, and in view of the pros and cons of online communication, we managed to avoid typical pitfalls of social media and followed recent recommendations how a good forestry communication should be carried out. And aside of the discussion of efforts spent and outreach realized, the social media fulfilled the purpose it was meant for: to provide insights into science-in-the-making and on project results for those audiences which we would have left out without using social media.

Outlook

Browsing through the lessons learnt in D4EU and reviewing recent literature about science communication in general and forestry communication in particular, there seems to be no easy answer to the question, how to communicate and disseminate forest-related topics in the best way. The issue already starts with the definition of 'best'. When 'best' is meant in terms of creating as much outreach as possible, then the applied multi-channel approach is surely a good option. Spenst and Gronau (2022) even go one step beyond by recommending the shift from multi- to omni-channel communication. While the used digital and analogue channels are still independent from each other in multi-channel communication, the channels are more intertwined in omni-channel communication. Similar to the concept of omni-channel marketing, an omni-channel communication is ought to enable user experience across devices and media. When dealing with forest-related topics, publics must be able to switch from one medium to another as simply as if it were one. From our point of view, it would be highly interesting to discuss and test how omni-channel communication can be applied in the field of forestry.

If someone interprets the 'best' way of communication in terms of impact, meaning whether communication enabled understanding of the complex topic of forests and forestry, learning and the change of attitudes and behaviour in a positive way, Farcy *et al.* (2019) and Matagne and Fastrez (2019) point out to the need of profound skills in communication. This begins with an understanding of different forest frames. When communicating, forestry professionals must consider, that "the public does not think about and perceive forests like them" (Matagne and Fastrez, 2019: 180). In addition, good communication requires skills in many areas such as knowledge about communication channels, storytelling, linguistic means, perception, education, networking, branding, marketing, graphic design – just to mention a few. Therefore, we advocate that higher forestry education should lay high emphasis on addressing and enabling communicative skills of students.

Study programmes should provide knowledge about how forests are perceived by different audiences e.g. by introducing the topics of forest frames and framings. Furthermore, forestry students should learn about the different stakeholders and interest groups of forests, wooded landscapes and forest industries in order to better address them via specific communication channels or trigger them with their preferred interests. Already students must recognize that wording matters a lot. Therefore, basic knowledge about different communication models and approaches, including the shift from deficit to dialogue and participation models which enables the involvement of laypeople and specific target groups, is crucial. With regard to the words of the Center for International Forestry Research (CIFOR), forestry students should understand that forestry is not simply about trees; it is also about people and their needs that are satisfied by the trees. Taking into account recent forest damages and dieback caused by climate change, future study programmes should offer theoretical and practical approaches of how to inform, involve, collaborate and empower society for a sustainable forest management and restoration.

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THOSE WHO CAN'T, TEACH!
HARNESSING EXPERIENTIAL LEARNING TO MOTIVATE THE STUDY OF BOTANICAL IDENTIFICATION AND ECOLOGICAL CONCEPTS

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Abstract

A lack of appreciation for tree species identification (dendrology) and understanding of ecological importance of trees/forests is likely to have considerable impact on society's capacity to address the climate change and biodiversity crises. This lack of appreciation and awareness among the general public and schoolteachers, creates difficulties for professional forestry education at undergraduate degree stages which rely on this fundamental knowledge. The "dry" nature of learning in lab-based dendrology sessions about how to describe tree morphology and taxonomy for species-level identification has consistently been found to be a "hard sell" to first-year university students.

A problem-based-learning intervention was introduced as part of a dendrology module to motivate students to learn themselves by teaching small groups of primary school children in the "outdoor classroom". The flipped-classroom approach to teach younger children was an innovative gambit designed to build self-efficacy and motivation to learn among students.

Students found the experience of giving guided tours "less scary" than anticipated and tended to enjoy preparing the tour. Overcoming the initial liminal uncertainty and discomfort in not knowing fully what was expected was less enjoyed. Ultimately, most students reported a positive experience and satisfaction in developing additional transferable skills and learning outside the classroom.

Keywords: Experiential and participative learning; field teaching; botanical literacy; plant blindness.

Introduction

"Learning dendrology has always been dull!" This seems like a truism of forestry and perhaps also ecology courses and has been bemoaned for quite some time (see Worrall, 1971). Lectures might follow such typical lines as "species A has interrupted

pith, species B has entire and round pith, the leaves of species C are bipinnately compound…" etc. This article delves into the motivational difficulty behind the teaching of this topic and describes an innovative approach to alleviate the tedium reported by students. A solution aiming to develop self-efficacy, a key element of social cognitive theory, is presented. This approach involves undergraduate students engaging in experiential teaching of primary school children to affect the undergraduate students' own motivation for learning. The approach is grounded in current teaching literature and the student's experiences of the approach is also evaluated using their reflective comments. The teaching approach is fully described and carefully links learning outcomes, teaching and learning methods and assessment strategies. Thus, it could be used directly by dendrology teachers or adapted more generally for teaching biological sciences and a variety of other applied sciences.

The module

Trees and Forests in Ireland is a stage-1 module which is required/core material for Forestry students, a recommended option for students of a number of Agricultural Science programmes, and an elective module for students from many other programmes. It caters for about 60 students in the autumn trimester and aims to introduce students to the concepts of tree identification whilst placing them into context by explaining how these largest of all living organisms grow, function in ecosystems and how society benefits from them. It is a general introduction to the subject of Forestry. There are four main learning outcomes required by the curriculum, the identification of a range of important tree species; understanding basic forestry concepts; an appreciation of forest and tree measurement techniques; and knowledge about ecology of world forests. While dendrology (identification of tree species) is a cornerstone of professional forestry practice, the knowledge of trees and forestry is vital for many other land- and resource-managers. In addition, dendrology is also a very relevant life skill for all people interested in the natural world around them (Brown, 2003) and how society may value it amid the climate change and biodiversity crises.

The mode of delivery for the module Is via 110-minute practical sessions on Tuesdays and 50-minute lectures on Wednesdays over a 12-week teaching trimester. The practical sessions facilitate group classroom work on dendrology as well as campus-based walks, while the lectures concentrate on more formal teaching of various concepts of forestry theory and practice. Practical sessions are led by a module coordinator and a postgraduate demonstrator. Lectures are provided by the coordinator with specialist topics contributed by every member of the Forestry unit's staff. For the forestry students in particular, this provides an introduction to the academics who will teach the technical elements of their professional degree.

The problem

The problem relates to students' difficulties with the dendrology aspects specifically and to their context the background and relevance of ecological education/knowledge. Students often struggle to identify the relevance of the taxonomic and botanical detail involved in dendrology, as well as to appreciate the depth of linkage between dendrology and other aspects of forestry (Leslie and Wilson, 2009). The main difficulty in teaching this module is trying to overcome a lack of motivation among the largely first-year students for the taxonomic details involved in tree identification. Th students often fail to appreciate their direct relevance to tree, forest and woodland functioning, to understanding ecosystem behaviour, and will ultimately affect their eventual ability to manage such systems. The issue appears to relate to the phenomenon described by Wandersee (1986) and Wandersee and Schussler (1999) as "plant blindness". Strgar (2007) defined this as referring to the "inability to see or notice the plants in one's own environment, the inability to recognise the importance of plants in the environment and human affairs, the inability to appreciate the aesthetic and unique biological features of plants and the tendency to rank plants as inferior to animals."

Botanical knowledge and taxonomic literacy are fundamental aspects of biology and ecology and are necessary for deeper understanding of environmental issues such as climate change and the biodiversity crisis (Bebbington, 2005; Reiss, 2020; Stagg and Donkin, 2013). It is generally accepted that modern-day children's knowledge is considerably lower than those of previous generations (Borsos *et al.*, 2021). This may be disappointing but hardly surprising given the world-wide trend for ever-greater urbanisation of the human population. This would seem to place a particular challenge for today's teachers. Interestingly, the majority of science teachers in post-primary schools in Ireland have a biology qualification and there is also a strong imbalance in school students studying biology (61% in 2014), though the school curriculum does not do very well in teaching ecology (Childs, 2014).

The solution

A problem-based learning (PBL) aspect was introduced to the module's practical sessions to promote better appreciation for the taxonomic detail and ecological significance of the tree species material among the group work sessions. The project consisted of preparing students to give guided tree tours on campus to primary school children from neighbouring schools. An additional outcome of the change could be the deepening of student's understanding of the link between tree identification and the other aspects of forestry to which they are introduced in this first-year course. It is hoped that the more intensive group work dynamics would also foster better socialisation among students and in addition begin to build the foundation for better

professional practice (which hopefully will be relevant to other disciplines, apart from forestry).

Students often struggle to identify the relevance of the taxonomic and botanical detail involved in dendrology, as well as to appreciate the depth of linkage between dendrology and other aspects of forestry (Leslie and Wilson, 2009). A challenging aspect of module assessment, to coin Bloxham and Boyd's (2007) principles, is to ensure valid, reliable and effective assessment of diverse student cohorts.

The participative teaching approach has been put forward as a mode that characterises the teaching-learning process by the active participation of the student. In relation to this, López-Noguero (2005) states that in a participative teaching method, students must participate from the identification of their prior knowledge up to the assessment of their learning. Therefore, the participative approach emphasises that students must actively participate in the creation of content for study, in the process abandoning the role of consumers and adopting that of co-producers (McLoughlin and Lee, 2007). It has been demonstrated that allowing students to summarise content helps them to develop a deeper understanding of it (Navarrete, 2013). In this sense, it is worth drawing attention to the fact that when an opportunity arises for students to take ownership of an idea, they can achieve better progress in motivation and longer-term learning (permanence) (Druin, 2014). In other words, guiding students in the identification of what they know about a specific subject directly affects the successive teaching-learning process, which will lead to new learning (Yager, 2009).

Research question/Aim

What is the effect of implementing a participative teaching approach on student attitudes towards academic performance and to the study of "dry" dendrological and taxonomic information? To respond to this, quantitative data originating from student module results were examined. Qualitative data originating from class observations and critical reflection were also examined.

Theoretical background

An experiential and participative learning solution to the issue above was developed to address the research question.

Taking the classroom into the campus

Students were required to work in small groups to develop a guided tour of the university campus trees for local primary school children. The flipped classroom approach to teach younger children was an innovative gambit designed to build self-

efficacy and motivation to learn among the student cohort. The typically "messy" problem was introduced as a request received by the lecturer from the university president to satisfy a request from a local primary school. The obvious solution is for the students of dendrology to "help" the lecturer to answer the request. This sets in place a requirement for students to develop in small groups a plan for a guided tour of campus trees for primary school children ages nine to eleven years. A series of visits to identify suitable areas of the campus to demonstrate the identification of a minimum number of tree species is then required. This takes advantage of what is being learnt of dendrological, taxonomic and ecological detail in weekly lab sessions. It culminates in each group of university students touring a group of primary school children, under the watchful eyes of voluntary teachers and lecturers, through various parts of the campus. It also resulted in each group producing their own tour report which was presented to the primary school teacher. A copy was also submitted to the lecturer for assessment along with individual descriptions of their personal contribution to the project and a short reflection (on how the project contributed to their learning, what strengths they brought to their group, the effectiveness of the tour for the school children and how the project could be improved).

Design and implementation of PBL intervention to invoke experiential learning

One of the first aims of a problem-based learning trigger is to identify to the learner that they need more knowledge resources than they have at their immediate disposal - that there are "known unknowns" which they need to investigate and remedy. The trigger is designed to provoke students into the liminal space described by Barrett (2013), from where they have to find a solution to the newly imposed unstructured circumstance. Peer collaboration among students with the varied programme backgrounds typical in this module aids a realisation that there are usually multidisciplinary solutions to the problem (MacDonald and Savin-Baden, 2004).

Rationale for problem-based learning initiative

Traditional teaching methods, such as "chalk and talk" etc., can be seen as passive learning approaches where organised pieces of information are directly provided for students. The usual criticism is that such teaching is often unnecessarily abstract and confusing for students and results in short-term knowledge acquisition. Changing to an approach where learning is more active on the part of the student requires the learner to take responsibility for the acquisition of knowledge. The much-quoted adage, usually attributed to Confucius, "If I am told, I forget; if I am shown, I remember; if I do, I understand" encapsulates the central theme of problem-based learning. It is of particular relevance to first-year students who have recently replaced the highly structured school learning environment for university life and don't fully understand the degree of academic openness in the new situation. The philosophy of active learning has been adopted and championed by several professional disciplines, especially medicine and engineering. Unfortunately, forestry education is somewhat poorly served with published examples of teaching and learning methods that enable

students to engage actively with the discipline (Leslie and Wilson, 2009). Indeed, there has been much criticism of how well university education has served professional disciplines including forestry in recent decades (Brown, 2003). Where foresters once enjoyed an unquestioned right to make decisions about landscape-level management on behalf of (but often without reference to) society, public attitudes have changed considerably and now often expresses concern for environmental issues and frequently raise suspicions that too many forests are managed for private gain rather than public good. Professional authority in many fields has increasingly been called into question and held to public account and negotiation. Once the confidence in professional knowledge is lost or professionals fail to respond to value conflicts, the most critical aspect of professional practice is often "beyond the conventional boundaries of professional competence" (Schön, 1987). Such conflict has resulted in the rigour-or-relevance difficulty that many university programmes have struggled with, i.e. either to increase academic rigour or increase curriculum breadth (Brown, 2003). However, for many professional situations both approaches miss the point that many difficulties cannot be solved simply through application of theoretical knowledge. Rather, as Schön (1987) puts it, problems need to be solved "in situations of uncertainty, instability, uniqueness and conflict." Thus, the introduction of PBL-enabled learning into the Trees and Forests in Ireland module is entirely appropriate.

Practice relevance of approach

In describing professional learning, Brown (2003) referred to "knowing-in-action". This was where what was learned may not have been "known" consciously, but where the skilful completion of a complex task occurred without the explicit application of specific theory or ideas. The example given was of a forester asked to identify a tropical tree species and who was usually unable to provide a list of defining characteristics - rather it is known from its "Gestalt"[7]. The implication of this is that professional practice is often quite at odds with university educational practice. Brown (2003) suggests that professionals only rarely solve problems but instead are more likely to reorganise them and apply appropriate solutions. And since the standard problem in practice is unusual and not routine, standard actions then produce unexpected results to which the professional must respond intelligently. Schön (1987) agreed and claimed that a skilful practitioner is one that can respond intelligently to the unexpected. That their actions are modified following reflection, leading to a revision of personal ideas that underpinned the "knowing-in-action". Schön described professional artistry as a constant cycle of spontaneous actions followed by reflection and modification of personal conceptions of a problem.

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[7] A German word, stemming from European silvicultural education, meaning form or shape, referring to Holism, the idea that natural systems and their properties should be viewed as wholes.

Knowledge of forest stand dynamics forms a component of forestry, ecology and natural resource management and has traditionally been a challenging area of learning (Wilson and Leslie, 2008). Experiential learning (an educational approach defined by Kolb (1984)) is seen as essential for professional education as it integrates learning across subject areas, promotes teamwork, develops analytical skills and boosts academic and professional competency (Brown, 2003). The authentic and ill-structured task used as a trigger in this assignment reflects the authentic nature of the non-standard problems described by Schön (1987). This ill-structured nature makes the tasks difficult to assess objectively (Strobel and van Barneveld, 2009), but this is only a difficulty if the assessment is summative. Where the assessment is used formatively, as in the assignment described here, this is turned into an advantage. In addition, the supervisors accompanying each group of students and assessing their performance (see assessment section) mimics the professional assessment that is a feature of so many managerial and practice-based jobs. The PBL-specific learning outcomes described by Lapek (2018) as 21st century skills make an even greater rational for the implementation of a PBL aspect to the learning in this forestry teaching module. Table 1 categorises the main additional transferable skills honed through the exercise. For first-year university students, the development of a range of transferable or soft skills is important. Reducing traditional reliance on formal written exams provides an opportunity to promote the acquisition of such skills (National Forum, 2016) while increasing the personal responsibility in students' ownership of learning.

Table 1: Developing skills for better learning. A range of transferable skills are developed by the first-year students studying this module (first column). Those skills have important applications for problem-based learning (PBL) situations (second column). The two sets of skills serve to enable the major module learning outcomes as by learning how to make scientific knowledge accessible to non-scientific audiences, students gain a greater maturity in how to learn themselves (third column).

Skills development	PBL-specific skill sets	Further (module) learning
Group work interactions	Critical thinking & problem solving	Improved attitude to learning
Independent researching	Application to real-life situations	Maturity in approach to management of learning
Report writing and presentation	Management of collaboration & communication	Mature engagement with peers, faculty and community
Digital skills	Creativity of approach	Strategy for engaging lower-achieving students
Insight into professional scope of subject area	Development of self-efficacy and personal confidence	Development of empathy for varied learning approaches and abilities

Design for implementation

Demonstrators and tutors, to be effective in moderating small group sessions, need a little training in the deliberate nature of the "messy" problem and the progressive

disclosure approach to allow the students experience the liminal uncertainty and discomfort in not knowing fully what is expected to overcome the problem. It is important that tutors should pose questions to the small groups (to promote the development of the tour plans) but then wait for a response from the group, even if it means enduring an uncomfortable silence rather than jumping in to fill the gap and continue a lecturing approach. A significant element is the development of communication skills within groups as students explore their new identities and altered situation (Barrett, 2013).

Aligning module outcomes and assessment strategy

A challenging aspect of module assessment, to coin Bloxham and Boyd's (2008) principles, is to ensure valid, reliable and effective assessment of diverse student cohorts. The assessment strategy (Table 2) was developed as a tripartite approach (i.e. assessment for, as and of learning, (National Forum, 2016)) using a formative focus for the first two sets of assessment, changing to a more summative focus for the third set:

- Early feedback regarding progress in module, harnessing "assessment FOR learning practice" can provide early feedback regarding progress against module outcomes:
  - Tree Report (mini project about an assigned tree species);
  - Dendrology Practical's assessing individual effort and provide individualised feedback.
- Employing "assessment AS a learning practice" empowers and engages students to become better learners. Blending peer-to-peer learning and assessment via reflective practice through the use of problem-based-learning creates an authentic, creative and engaging assessment opportunity (after Reinholz, 2016). The oral presentation aspect inherent in the guided tree walk project (Table 2) also increases the assessment's inclusiveness and diversity.
- "Assessment OF learning" directly tests and demonstrates the acquisition of knowledge. The weighting of the final two assessments reflects the importance of the two main knowledge areas, while spreading the temporal cost of revision to relieve student effort:
  - Dendrology Practical exam; and
  - Final written exam.

The loading of university students with multiple assessments during mid-trimester and exam periods at the end of teaching terms has become an issue according to recent trends (National Forum, 2016). The guided tour exercise ameliorates this situation by redistributing the loading away from the end of term. The use of a group mark also reduces the pressure on individual students and changes the emphases of assessment from summative to formative.

Table 2: The group project, a guided tree-walk for primary school children, is the central spine of module assessment strategy and examines all four module outcomes, A to D, using a tripartite approach (i.e. assessment for, as and of learning; the first two being formative in nature and the third mainly summative). The objective of the strategy is to reduce pressures associated with traditional end-of-module exams and promote instead a more authentic shared group experience, while deepening learning and increasing engagement and motivation.

Module Learning Outcomes	1(a). Tree Report	1(b). Dendrology Practical	2. Group Project	3(a). Dendrology Practical Exam	3(b). Final Exam
Assessment…	…for learning		…as learning	…of learning	
A. Identify range of important tree species	☐	☐	☐	☐	
B. Understanding of forestry concepts	☐	☐	☐	☐	☐
C. Appreciate forest and tree measurement			☐	☐	
D. Knowledge about ecology of world forests	☐		☐		☐
Assessment timing1	Week 4	Week 5	Week 8	Week 12	Week 14
Module marks2	10%	10%	20%	20%	40%

1 The individual assessments are administered throughout a 12-week trimester and the following exam period.

2 Each assessment carries a proportion of the total module marks, designed to distribute module learning effort and to reduce student stress.

Results

Grade distribution and comparison with previous years

Quantitative and qualitative data were collected using various approaches to characterise the impact of introducing the guided tour project to the module in 2020. In addition to the group project guided tour document, each student was required to include a personal critical reflection to the report. The module grade frequency

distribution for 2020 is shown in Figure 1 and is contrasted with the distributions from the previous two years. There is a general improvement in the results for 2020. However, the inherent annual variation in the student cohorts from year to year, combined with the change in module structure, makes it difficult to attribute the outcome to a specific module component result.
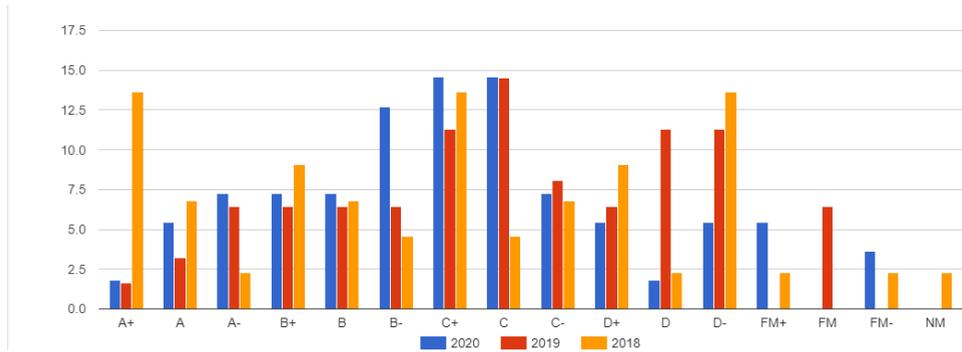

Figure 1: The overall module grade trend from 2018 to 2020 -by percentage of all students. FM+, FM and FM- are fail grades and NM indicates that work submitted did not merit a grade.

Student perceptions

Each student group was required to prepare a common group report, and once assessed all members shared the respective grade. However, every single student added their own reflection on the project based on the following questions:

- How did the preparation for a guided tree walk contribute to my learning in this module?
- What strengths did I bring to my group? How was the group organised? Why? How was the guided tour effective for teaching primary-school children about trees?
- How could this exercise be improved to produce a better guided tour and to increase my learning?

Many reported that the project "helped" them:

- "understand and identify trees in real life", "become more familiar with the tree identification guide".
- "I really enjoyed working on this project" opined one student, citing how pleasant it was to "change from the classroom-based learning".
- "I am much more likely to remember the information regarding the different species compared to note taking from lectures."
- "The project really helped me as it allowed me to learn through doing. I learned so much by researching the trees that I did not know before and I also found some interesting facts that made the species stand out to me and imprinted in my brain."

- "I enjoyed working on this project because it was fun and also it was my first experience of working on a group project. An excellent outlet to use our new skills in dendrology."

Quite a number of students referred to the development of interpersonal skills, extending friendship networks and how to work in a group or team work:

- "I have learned more about working in a group, communicating effectively and dividing the workload between the members."
- "I thoroughly enjoyed it, I learned some new information, met new people and made new friends, contributed more marks to my final grade without having to sit an exam and at the end of the day, had a very fun and interesting experience. I enjoyed group work element."

A number of students clearly understood the concept completely:

- "The nature of the group project meant that I had an additional incentive for pursuing these trees for identification. Thus, the requirements of the project inspired me to adapt a very active involvement. I gained an understanding of how and where to use dendrological terminology."

Some students clearly appreciated the goals of the guided tour and its outreach potential:

- "I came away with a new outlook and perspective on trees, nature and the incredible importance they serve to our world. The effectiveness of the tour by the amount of knowledge which a child comes away with after the tour, and rather by the want of the child to experience such a learning adventure again."
- "I hope the clear, interesting and appealing facts that I hope have intrigued and captured the children's imaginations."
- "[The project] helped me to understand the basics of tree identification by seeing it through a primary school students' eye. Trying to find the easiest way for a child to remember a certain tree species helped me and my peers to also identify the species in the easiest way possible."
- "We included interesting and defining facts about the trees on the walk as well as photos and sketches so the children could identify the trees on the route, and it would be an interactive experience."
- "Teaching children about trees through a guided tour would be a more effective way of teaching rather than just watching a video or reading from a book alone. Kinaesthetic learning is a mixture between visual, audible, and active based learning, being capable of incorporating this would allow for higher levels of engagement and education."

There were a substantial number of students that referred in similar fashion to methods of learning and pointed to an appreciation of the outdoor classroom framing of the project.

There were of course a number of negative aspects reported, the most frequent of which was that six members of a group were too many, causing difficulties in organisation and communication. Two students criticised the November period (when broadleaved trees had no leaves) as being an unsuitable time. One student also didn't fully appreciate the problem-aspect of the project:

- "Apparently there is no better way to learn how to swim than throwing yourself into the deep end. I felt like that is what happened to us."

By way of improvements, various students suggested smaller group sizes, that giving tours to secondary school children or to adults would be preferable, an earlier start date in the teaching term and that an opportunity to run guided tours for other class groups would be interesting and useful ahead of the arrival of the school children. Interestingly, one student suggested

- "feedback from the kids would also be beneficial to our learning about forestry."

Another opined:

- "I think it is quite an interesting topic and there should be information about the trees and forests in Ireland included in the primary school syllabus in the Irish education sector."

Discussion

The root problem of teaching something perceived as being dull is one of perception (i.e. of the value of the material) which leads to limited motivation for learning. The basis of the PBL intervention in this study serves as a vehicle to address this. Placing students in a position to teach provided an opportunity to recognise their own ignorance and render them open to the possibility of learning (Cortese, 2005). The motivation to act on this identified shortcoming in knowledge comes from the trust the lecturer places in students through sharing, in collegial fashion, an authentic "real-world" problem. The situation presented to the students identifies the reputational implications for the lecturer and for the university which will accrue from the success or failure of the outreach exercise. In addition, further responsibility is heaped onto the students by using primary school children as subjects. This requires that all concepts are presented in plain and relatively simple language, requiring good basic understanding of the topics. Clearly, considering the students' comments, most felt this was the case. The university students' seniority also provided a positive self-

efficacious circumstance. They were placed in positions of trust and knowledge and were a little under obligation to strive to meet such expectations. Enactive mastery experiences have been shown by Van Dinther *et al.* (2011) to be powerful sources for creating a strong sense of efficacy and to be frequently applied in university teaching. Self-efficacy, the belief in one's own ability to succeed in achieving an outcome, is deliberately promoted by the intervention design. High self-efficacy reflects confidence in the ability to exert control over one's own motivation and behaviour and allowed students to become advocates for their own needs and supports. Working in small groups to develop the guided tours entailed constructive conflicts within teams of students, practically emphasising the requirement for organisation of the knowledge (Cortese, 2005; van Dinther *et al.*, 2011).

The theoretical basis for the "flipped classroom" can be found in the learner-centred and social learning theories of Piaget (1967). The flipped classroom is a learner-centred pedagogical approach that reverses the traditional roles of in-class instruction and out of class activities. In combination with motivation from the enhanced responsibility to inform and entertain the school children ("to ensure they weren't bored"), the students felt accountable to prepare more carefully for questions around the knowledge they were preparing to impart.

This significant contribution the PBL project makes to the module's continuous assessment element, underlines its purpose in promoting an active learning process (Waters and McCracken, 1997). Furthermore, the practice context of the PBL exercise reflects student development trajectory from novice towards expert (Macdonald and Savin-Baden, 2004). There is professional reality in assessment during practice (i.e. grading by supervisor of tours) as this is frequently an aspect of professional work later in professional life.

Hubackova and Ruzickova (2013) describe four main inter-related components of learning motivation in university students. Namely, the student's personality and learning methods; the teacher's personality and teaching methods; the nature of the subject matter; and, finally, the cultural environment of the university. While acknowledging that the latter two are not within the immediate control of educators, the first two deal directly with student interests, and found particular success in managing seminar interactions (both the formal directed learning), but also the peer-to-peer interactions and discussions about relative progression with in-class assignments. To address the last component, the intervention described makes deliberate and conscientious use of the extensive parkland available within the university campus as an outdoor classroom. The assignment is designed to create a need to identify specific spaces to demonstrate a certain minimum number of tree species identifications, but also to illustrate ecological interactions. This requires multiple revisits by students working in groups to discover for themselves points of inspiration, with which in turn to inspire the children. This process necessitated active

learning to translate classroom-learnt facts about plant organisation, nomenclature and ecological function to the "real world". Placing this into context within a guided tour allows for discussion about the experience and other reflective practice. From a pedagogical point of view, this corresponds to the experiential learning theory described by Kolb (1984) as underpinning practical outdoor learning.

Returning to the much-criticised dullness of subject matter, efforts were made to include the teaching of both form/morphology (classical dendrology) and function (physiology) together at every opportunity to illuminate both, otherwise both are seen as potentially uninteresting or perhaps worse. The tree species to be covered by the module also have to be carefully chosen (Worrall, 1971) to give the lecturer scope to demonstrate the specialist knowledge, enthusiasm and interest found by Strgar (2007) to greatly enhance student's interest. For example, this module pays special homage to the Hyperion and General Sherman trees (the tallest and largest trees in the world, respectively). Several groups made extreme efforts to locate their campus tour route specifically to include specimens of the latter species and included reference to the renowned champion trees.

Critical reflection

There are a growing number of studies investigating the flipped classroom approach. Although most of these have focused on student perceptions rather than performance, so little empirical evidence exists on the impact of flipped classrooms on student performance (Goodwin and Miller, 2013). Thus, it would be useful to address this in future. An assessment of "plant blindness" before and afterwards (e.g. similar to Amprazis *et al.*, 2021) might yield appropriate empirical data for such a test of performance. Further, a study of the contrasting outcomes for the university and school cohorts would elucidate differences in motivation for learning at both stages for similar material. Though the depth of knowledge derived is likely to be quite different, the processes and approaches to developing conceptual understanding of ecological systems for the two stages of students may still remain quite similar.

Conclusions

The true essence of education, according to Amprazis *et al.* (2021), is to equip students with the scientific acumen to "secure their health, their nutrition and their quality of life". Increasingly, this is a challenge for the academic and educational community to enable students at all levels to counteract the plant blindness phenomenon and contribute more fully to national and international debates on environmental issues. The carefully managed inclusion of outdoor experiential learning opportunities, with their inherent collaborative practice and sociocultural experience, should result in

continued improvement of active student learning (Moseley *et al.*, 2020). The reassuring number of student comments which described high levels of motivation and fun associated with the project presented indicated the positive nature of the learning experience.

Implications for Education

An empirical test of the effect of implementing the guided tour project is impossible to achieve practically without dividing a class and including two streams; with the project and without. The annual variation in the student cohort also makes year-to-year comparisons difficult to assess objectively. The outcome of how the students view their experience (relative enjoyment), in addition to how they found the learning for the module (relative difficulty) may be an equally valid form of assessment. Since the academic knowledge they amass, in conjunction with the skills they develop, are of a fundamental nature for subsequent degree stages, this aligns with the holistic concept of experiential learning (Kolb, 1984; Mosely *et al.*, 2020), as they are combined with a clarification of values and a developed capacity to contribute to society.

The approach described in this paper is detailed in terms of learning outcomes, teaching and learning methods and assessment strategies. Thus, it could be used directly by other teachers of dendrology specifically and adapted more generally for teaching biological sciences and a variety of applied sciences.

Ethical issues

The supervision of primary school children required that a police-vetted adult accompanied each student group that provided a tour for a school group. Several university academic staff and schoolteachers volunteered for this and acted as rapporteurs to assess the guided tours (using a template provided by the coordinator).

The use of feedback information and reflections on the exercise provided by the university students was subject to an application for exemption from full ethical review by the university Office of Research Ethics (decision reference number LS-E-21-13-Tobin).

David Brophy, Thomas Cummins, Marie Doyle, Bredagh Moran and Edward Wilson also made valuable contributions as tour assessors.

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DO GOOD AND TALK ABOUT IT - BUT HOW?
COMMUNICATION AS TEACHING TERM AND VALUE AT THE DEPARTMENT OF FOREST SCIENCES, FACULTY OF ENVIRONMENTAL SCIENCES, TU DRESDEN, THARANDT, GERMANY

JACOB RIEDEL, ANNE AUSTEN, JESPER HORST, KONSTANTINA FOTIADI

Abstract

The aim of this paper is to highlight how communication is covered by the study programmes offered at the Department of Forest Sciences, Faculty of Environmental Sciences, TU Dresden, Tharandt, and how extracurricular activities enable students gain communication skills through learning by doing, as well as how the university groups practice communication at the Forest Sciences campus in Tharandt. For this purpose, the paper focuses on modules with teaching components on communication in the curriculum, internal and external communication by the university groups and the importance and benefits of communication in forestry in general. The authors' own experiences from various activities and involvement in university student groups as well as studying at the Tharandt campus served as a basis. In addition, an analysis of the university groups' social media channels helped us to visualise the reach of the communication. In particular, it was analysed how many people could be reached via the university groups' social media accounts in a one-day period. The following are the key messages of this paper: communication as part of the curriculum is present, but the coverage should be increased. Not communicating also constitutes a form of communication, which may lead to undesired consequences. A broad network of university groups can only function through communication and is at the same time a multiplier of internal and external communication. Communication is the key element of public relations and successful cooperation. It can be learned mainly theoretically in the curriculum and practically through involvement in extra-curricular activities such as university groups' activities. In a modern "VUCA" ("volatility", "uncertainty", "complexity" and "ambiguity") world, communication is the central tool for overcoming crises. Therefore, more attention should be paid to the topic of communication in the forest sector and Forestry education.

Keywords: communication, students, curriculum, extra-curricular activities, university groups

Introduction

In a small town near Dresden in Saxony (Germany), among other places, the journey of forest science began. (Lochmann, *s.a.*) More precisely in Tharandt. But not only forestry sciences found their beginning in Saxony, also the concept of sustainability (in forestry) was born in Saxony (BMEL, 2023). Various study courses are offered in Tharandt at the Department of Forest Sciences which is part of Technische Universität Dresden "In 1816 Cotta's private forestry school in Tharandt was taken over by the state and transformed into the Royal Saxon Academy of Forestry. The affiliation to the Technical College (Technische Hochschule Dresden - now TU Dresden) took place in 1929." (Technische Universität Dresden, 2024a) Part of this department are four students who would like to share their experiences about communication in the following text. They can make qualified statements because they have gone through several honorary positions within the university groups (in German HSG/Hochschulgruppen). The authoring students are all studying or have studied the Forest Sciences BSc degree programme.

An excerpt from the description of the degree programme provides a brief overview of the course: "This course of study, complex, interdisciplinary and research-oriented, deals with the forest ecosystem in its components (etc. plants, animals, soils), in its entirety and its manifold products and services. Graduates are prepared for applied professional fields as well as subsequent master programmes." (Technische Universität Dresden, 2024b) For the sake of best understanding, the four students are briefly introduced.

- Anne Austen was a Master's student and is active in university groups such as the Young Forestry Network (JNF), the Heinrich Cotta Club (HCC), the Working Group for Natural Forest Management (ANW) Tharandt and the Student Council for Forest Sciences Tharandt (FSR). There she was a spokesperson, among other things. After studying sociology, her motivation was to study something related to nature and to fill the interface between forest and society.
- Jesper Horst was responsible for public relations at the Heinrich Cotta Club and also part of the ANW-HSG Tharandt. For Jesper, values such as environmental protection, nature awareness and the management of natural resources were decisive factors in his decision to study forestry.
- Konstantina Fotiadi is the current speaker of the FSR Tharandt. For Konstantina, there was one outstanding reason to study forestry: She wants to spend the rest of her professional life not (just) in the lab or office, but out in nature.
- Jacob Riedel is active in various HSGs such as the JNF, the ANW and also the FSR. In the FSR he is the speaker. As the issues of the climate and biodiversity crises have become more of a focus for science and the public in recent years, these topics were the decisive reason for Jacob to study forestry in order to learn about ways of dealing with these crises.

The content of the paper describes four main points: University teaching modules on communication, internal communication of the student body, external communication of the student body, and lastly, the importance of communication in general and its positive effects.

Methods

The basis for this paper consists of online research, oral reports from students, personal experiences of the authors, and an analysis of the social media landscape among forestry students. This combined approach makes it possible to consider both the formal curriculum and informal, practice-oriented learning opportunities. The analysis of social media accounts provides insight into the external communication strategies of student groups and their reach among stakeholders.

Communication aspects covered in the curriculum

There are a total of four study programmes at the Department of Forest Sciences at the Technical University (TU) Dresden: Forest Sciences (BSc), Forest Sciences (MSc), Wood Technology and Wood Economics (MSc) and Tropical Forestry (MSc). An analysis of the timetables of these programmes revealed two modules on communication in the BSc programme, two in the MSc programme in Forest Sciences, and one module in each of the other two Master's programmes. These modules are called FOBF44 Environmental Communication and FOBF45 Social Competence in the BSc (TU Dresden, *2023e*).

According to the module description, the Module *FOBF44 Environmental Communication* has the following contents: "The module covers environmental communication - environmental education - forest education: definitions, goals, situation in Saxony and Germany. Furthermore, it includes the organisation,

implementation and evaluation of thematic events taking into account the principles of environmental communication as well as the planning of interactive projects for school groups." (TU Dresden, 2023d).

For the module *FOBF45 Social Competence*, the module description includes: "The content of the module is techniques for coping with communication and decision-making tasks typical for the profession as well as methods for influencing interlocutors in a targeted and interest-related manner." (TU Dresden, 2023d).

In the Master of Forest Sciences, the two modules are UWFMF25 Communication and UWFMF11 Marketing (TU Dresden, 2023a).

The content of the module *UWFMF25 Communication* is described as follows: "Contents of the module are topics on communication science as an interdisciplinary social science, communication as social behaviour, action and interaction as well as the process of understanding with corresponding feedback, the communication medium language, theoretical approaches for explaining communication and conflict resolution in society. Further topics of the module are communication on environmental risks as well as communication in school education, intercultural communication, communication in business, scientific and professional communication as well as everyday communication in civil society." (TU Dresden, 2023c).

These three content-related module descriptions are considered to be representative of the communication elements in the curriculum. In the Master of Wood Technology and Wood Industry there is the module FOMH10 Marketing of the Forestry and Wood Industry. In the Master Tropical Forestry, the topic of communication is covered in the module Communication and Conflict Management (TU Dresden, 2023b). For all modules, both MSc and BSc, five ECTS can be earned. Each of these modules is open primarily to forestry students.

Even though all these modules are basics for successful communication in later careers, important communication skills in the field of forestry have been and still are partly lacking. Especially in current times of crises (Popkin, 2021), successful communication and transparency are important, otherwise science can also be quickly doubted through communication from others, e.g. by Peter Wohlleben (Mühl, 2019; MDR, 2023) and thus lead to a loss of trust and a shift in discourse. Due to a strongly changing environment, e.g. the climate change (Ulrich, 2022), students are also dependent on better (crisis) communication, which should be given more space and above all more practice in their studies.

Communication outside the classroom/through extra-curricular activities

But there are also good opportunities outside the curriculum to learn practical communication and achieve soft skills. About some of the university groups in Tharandt:

- The FSR is a university political body and also a networking point for the other university groups.
- The Heinrich-Cotta-Club is a student club and provides a cultural programme.
- The ANW is a group that mainly deals with practical aspects of silviculture.
- The IFSA (International Forestry Students' Association) is an international forestry organisation for students and serves as means for networking, exchange and joint events.

- The Tharandter Jagdhornbläser is focused on musical and cultural entertainment.
- The JNF (Junges Netzwerk Forst) is the junior organisation of the German Forestry Association (Deutscher Forstverein) and serves as a professional, but also political exchange group.

Within the framework of the university groups, numerous volunteer-organised excursions, fairs, conferences, work assignments, discussions, events and much more are organised. These events promote good internal and external exchange and a cooperative atmosphere for students at the department.

Another significant part of communication can be found in the area of social media. The university groups manage five Instagram channels and together have around 4000 followers. Followers include ministries and companies. (Heinrich Cotta Club, *s.a.*; FSR Forstwissenschaften Tharandt, *s.a.*; ANW Hochschulgruppe Tharandt, *s.a.*, IFSA LC Tharandt, *s.a.*; Tharandter Jagdhornbläser e.V., *s.a.*). These channels are particularly important for stakeholder communication and contribute significantly to acceptance, advertising and transparency.

Benefits of communication

Communication with stakeholders and society does not only benefit the recipients of information. It also provides significant learning opportunities for students. In a world where communication is more important than ever, students preparing for careers in the forest sector need strong competencies in this area. Communication as a component of teaching is an important building block of forestry studies, but it can still be expanded. The communication among students alone helps as a collective to complete the daily study routine successfully and to support each other. At the same time, communication contributes to the broader social and cultural dimensions of university life. It enables community-building through social events such as parties, excursions, lectures, and conferences. Ultimately, communication is the key element for social interaction on campus. Without it, neither academic cooperation nor extracurricular engagement could function effectively

Conclusion

Studying at the Faculty of Forest Sciences can be the most formative time of a person's life in two respects.

First, it provides graduates with the knowledge and skills required to meet the challenges of a rapidly changing environment, thereby contributing to the

development of Europe as a business location and securing long-term prosperity. At the same time, it fosters personal, social, and societal development.

Second, the study period offers unique opportunities for personal growth: testing one's abilities, developing individual strengths, looking beyond disciplinary boundaries, and building lifelong friendships.

Across both dimensions, communication plays a central role. It links academic training with personal development, supports cooperation, and enables effective interaction with stakeholders and society. As Seifert (2011) put it: "Forestry is not about trees, it is about people." For this reason, future curricula should integrate even more practical training in communication to prepare students for increasing societal demands in forestry.

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INTRODUCTION OF THE FACULTY OF FORESTRY OF THE UNIVERSITY OF SOPRON: HIGHER EDUCATION OF FORESTRY IN HUNGARY IS BEING RENEWED

BÁLINT HEIL, GÁBOR KOVÁCS

Abstract

While the period since the fall of the communist regime in Hungary in 1989 has brought many new challenges to our society, the Hungarian higher education system has continued to operate on an unchanged basis for a long time. The government has therefore introduced a new non-profit foundation maintainer model over the past two years. The University of Sopron (SOE) joined the group of Hungarian model change universities on August 1, 2020.

Keywords: Hungarian forestry education; university model change; educational reform

Introduction

In Hungary, higher education in forestry is exclusively offered in Sopron, at the Faculty of Forestry, which is the successor of the Academy of Banská Štiavnica, founded in 1808 (Lakatos, 2010). In 2021 the Hungarian parliament passed a legislation setting up foundations for running universities with the aim of a more efficient management. Sopron University is one the 21 higher educational institutions in Hungary, which decided to take over this new structure. The reform process, which began simultaneously in the four faculties of the University of Sopron (SOE), aims to rejuvenate the organizational and personnel structures, as well as the content of education and research (Figure 1).

Currently, the Faculty of Forestry Engineering consists of four institutes, namely:

- Institute of Natural Resources and Forest Management;
- Institute of Geomatics and Civil Engineering;
- Institute of Environmental Protection and Nature Conservation;
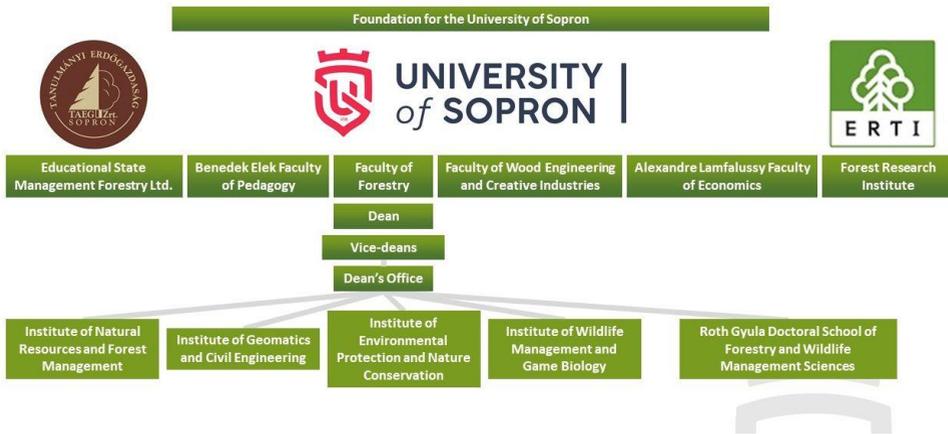- Institute of Wildlife Management and Game Biology.

Figure 1: Organogram of the new foundational form of University of Sopron.

The organizational background structure of education

The individual institutes within the faculty have been established based on the focal points of education regarding training output competencies across five fields of study, following the order mentioned above:

- Forest Engineer integrated BSc and MSc;
- Land Surveyor BSc;
- Nature Conservation Engineer BSc and MSc (later also in English);
- Environmental Engineer MSc (starting in 2023 also in English);
- Wild Game Management Engineer BSc and MSc.

In addition, the faculty is also home to the Roth Gyula Doctoral School of Forestry and Wildlife Management Sciences. Currently, there is an examination of the possibility of transitioning the PhD programmes, which are currently categorized under agricultural sciences, towards a multidisciplinary doctoral education approach, encompassing agricultural, technical, and environmental sciences, in one school.

In the organizational structure of the foundation, the Hungarian Forest Research Institute and the TAEG Educational State Management Forestry Ltd. (TAEG), which previously operated as independent state entities, have also become part of the university. Over the past two years, several joint research projects have been initiated involving these three units, with the aim of directly implementing the results of forestry research into practice and transforming TAEG into a nationwide model educational forestry facility.

In the education of forest engineers, the professional priorities were determined through collaboration with stakeholders from the forestry sector, including public and private forest managers, as well as professional organizations. Our efforts align with the recommendations of the FAO-ITTO-IUFRO report on global forestry education in 2022 (Rekola et al., 2022). To support these objectives, we have introduced what we refer to as a mobile semester and a project semester.

Initial results of the educational reform

The extensive professional consultations have yielded clear positive feedback and have led to increased interest in our programmes, resulting in a significant growth in the number of students applying to the faculty (Figure 2). Despite this, we have only marginally increased the number of admitted students, as our primary focus is on improving quality. The Faculty of Forest Engineering offers education in five fields of study (see above), and all of these began following the new curriculum in September 2022.
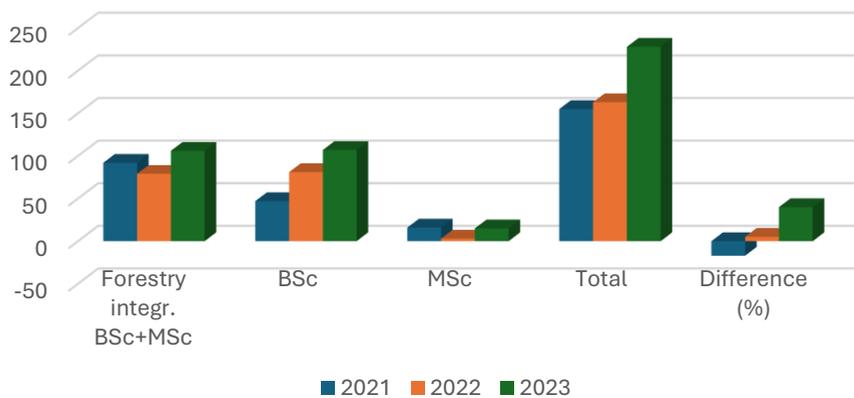

Figure 2: The impact of the comprehensive curriculum reform combined with the university structural change on university admission numbers at the Faculty of Forest Engineering, University of Sopron. The rightmost column displays how the number of student applications has increased or decreased in percentage terms compared to the previous year.

The forestry sector, affiliated at the Ministry of Agriculture, is now implementing the coordination of the full spectrum of the educational system of secondary vocational workers, secondary school technicians, tertiary university education, ongoing

professional training, and credit-based specialist training. To facilitate this, the University of Sopron has established the Forestry Sectoral Knowledge Centre with a unique role, in collaboration with five agricultural vocational training centres nationwide, covering agricultural secondary and adult education.

As a result, in the autumn semesters of 2022 and 2023, approximately thirty secondary vocational workers each (specializing starting in the second year) began their second-year studies in vocational high schools. In the summer of 2023, this unique new organization in the country organized the practical dual-system training for over 350 forestry vocational secondary school students, a significant achievement that the Faculty of Forest Engineering at the University of Sopron has been actively involved in since its inception.

Furthermore, several credit-based specialized training programmes have been introduced to the forestry sector since its establishment. The operation of the Forestry Knowledge Centre is coordinated with other agricultural education programmes within the agricultural sector, in accordance with the cooperation agreement with the Hungarian Chamber of Agriculture.

Further plans in education development

The development of education continues. In spring 2023, we reformed the final examination for forestry students. During the preparation period, students choose a specific forest area through a lottery system on the TAEG Ltd. premises. Within the available time, each student creates a portfolio in detail, outlining the tasks that need to be completed in the designated forest area during the next planning cycle. Subsequently, the students present their portfolios in person at the examination site and respond to questions from the Examination Committee. With this final examination, they have practically taken the first step towards handling the complex tasks awaiting them in their practical careers. The examination locations are associated with plainland, hillside, and mountainous forest management.

In 2024, we will further enhance the preparation for the final examination by incorporating an extensive field study during the spring semester. During this field study, students will actively engage in solving tasks related to various forest management scenarios. This includes preparing reforestation plans, planning forest management and timber harvesting operations, financial balance sheets, permit applications, regulatory reports, technical tasks, communication skills, and social consultations with national parks, civil organizations, and authorities.

Starting from 2024, we will initiate the development of digital educational tools/materials, and according to our plans, by 2026, first materials will be available across the entire forestry education spectrum – from vocational training and technical secondary education to university and postgraduate professional training. In the initial phase, those teaching colleagues who undertake the creation of digital educational materials will receive reduced numbers of teaching hours and additional compensation, thereby motivating them to expedite the transition to digital formats.

We are placing significantly greater emphasis on foreign language education than before. We have doubled the number of foundational and specialized language courses and doubled the previous number of language class hours too. We want our students to have the opportunity to continue their studies abroad in larger numbers. Therefore, we have quadrupled the time allocated for foreign language instruction within the regular curriculum.

In the 2024-25 academic year, we plan to launch the forestry engineering programme in English, as there is a strong interest primarily from Eastern European, Middle Eastern, and Central Asian regions for this programme.

The Faculty of Forest Engineering is aiming to explore new directions in the development of its international educational and research collaborations. While in the past, the faculty traditionally emphasized connections with Western European universities, it is now expanding our reach to regions mentioned earlier, which can provide guidance in adapting the forestry practices to climate change. This approach may provide a prominent role to topics such as forest water management, combating desertification, forest fire prediction and prevention, forestry reproductive material cultivation, and smart forest-based forest monitoring.

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CHANGES IN THE NUMBER OF FOREST VISITORS IN THE BAKONY REGION (HUNGARY) DURING AND AFTER THE COVID-19 EPIDEMIC WAVES[8]

GYÖRGY CZIBULA

Abstract

The Covid epidemic between the spring of 2020 and the summer of 2021 showed that there is an increasing demand for various forms of forest-related tourism. Number of visitors in forests broke records in certain places: 32 million visitor days were registered in 2020 in Pilisi Parkerdő Ltd. alone. In this article, data originated from the automatic visitor counters placed on certain forest lookout towers, are presented. Processing the data, insight of the number and distribution of hikers in each period can be obtained. As a result of the research, forest managers can learn more about the popular tourist destination, furthermore, knowledge is gained about the motivations and needs of forest tourism participants. Based on this, public welfare investments that meet real demands can be planned in a cost-effective manner. Ideally, the results achieved can bring satisfaction to all actors involved in forest tourism. On the demand (visitor) side, targeted and needs-tailored developments increase the experience factor of the time spent in the forest. On the supply (forestry) side, knowing the motivations makes the performance of public welfare tasks more efficient, which ultimately contributes to the improvement of the sector's image.

Keywords: Forest tourism, visitor numbers in forest areas, opportunities of forest tourism, economics of forest tourism, demand and supply side of forest tourism

Introduction

The 21 Hungarian state-owned forest holdings that manage more than half of the domestic forest stands in Hungary, are responsible for forest public welfare facilities, too. The most visible and one of the most popular forest public welfare investments are forest lookout towers across the country. The lookout towers in the operation area of Bakonyerdő Zrt., which is the subject of the study, were typically placed in the most visited forest blocks. Therefore, the trend of visitor numbers during the Covid epidemic waves was examined, moreover, also studied how the trend changed after the epidemic waves.

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[8] This paper is based upon a poster presentation, therefore, its subject does not closely reflect the main topic (communication and education) of the conference.

The Covid epidemic between the spring of 2020 and the summer of 2021 revealed an increasing demand for various forms of forest-related tourism, in general. To the greatest extent, the so-called one-day destinations, mostly close to the big cities, have seen the greatest increase in the numbers of attendance (Benkhard, 2021). Based on the data of specific measurements, 32 million visitor days were calculated in the area of Pilisi Parkerdő Ltd. in 2020 (Pilisi Parkerdő Zrt., 2020). The blatantly high number is of course due to the proximity of the capital, but the calculated data can give an idea of the national situation. Using empirical methods, it can be said that the number of forest visitor days in the country is close to 60-70 million per year (own estimation), which means that every Hungarian citizen spends an average of six to seven visitor days in the forests per year. These data should be treated cautiously, since regular forest visitors imply the bulk of the visitor days. It follows from the above-mentioned deduction that one of the most difficult questions in the field is: how many people actually participate in forest tourism?

Materials and methods

The Hungarian Central Statistical Office (KSH) does not directly measure the demand side of forest tourism. Similar categories are entertainment, relaxation, sightseeing and nature walks, so these data serve as the basis for the demand analysis. Nature walkers are hard-to-count, almost invisible participants of tourism, because most of them cannot be registered due to their special activities. They are also outside the scope of official statistical data collection, so they remain invisible to the system. Many of the tourists do not go to the exhibition sites, moreover, they use few services suitable for measuring traffic. For example, they often go hiking, but they don't use public transportation, or they don't go to a restaurant or bar every time. An accurate survey is made difficult by the fact that the duration of stay in the area usually does not exceed 24 hours, so they do not use accommodation, either. There is no other reliable "technique" to register hikers than on-site counting and questionnaires, which is an extremely human resource-intensive and time-consuming work, but this method still provides the most reliable data (Joó, 2020).

The annual reports of the national park directorates also contain data suitable for analysing the demand side of forest tourism. 62.3% of those who visited the territory of the Balaton Uplands National Park in 2017 took a forest walk or hiked in the forest. Among the services, educational trails and visitor centres were used by 48.3% of those who came here, and 34.6% participated in a guided programme (own calculation based on BFNPI, 2018).

The growing popularity of healthy lifestyle, the possibility of active leisure time in nature and the experimental factor of forest hikes have directed general attention to the forest areas (Benkhard, 2018). The forest lookout towers have already become the

permanent destinations of various tour recommendations, articles and posts, promising an easy-to-access, experiential excursion, thus their popularity has peaked in 2020 (Figure 1).
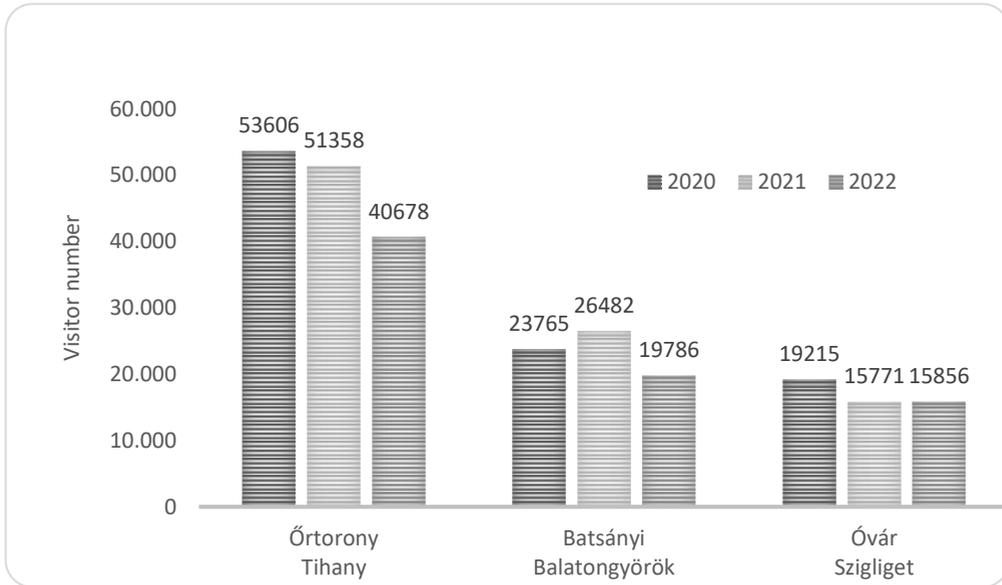

Figure 1. Yearly visitor numbers of the three forest lookout towers examined.

By analysing the data of the automatic visitor counters placed on the lookout towers, an insight of the number and distribution of hikers in and over each period can be obtained. The data are valuable because these counters register visitor movements directly created in the forest area, which are difficult to measure by other means, and which really fall within the scope of forest tourism. In the operation area of Bakonyerdő Ltd., a visitor counting device has been installed in six lookout towers. The tools of three of the six were in continuous operation during and after the Covid epidemic (Őrtorony – Tihany, Batsányi – Balatongyörök and Óvár – Szigliget lookout towers), so their data are suitable for comparison. It is important to mention that the accessibility of the examined lookout towers was ensured even during the epidemiological emergency periods, no physical closure was introduced.

Results and discussion

Spring, summer and year-round visitor data of the years 2020, 2021, 2022 were collected and compared. Covid emergency periods and the preventive measures introduced during them, of course, have an impact on visitor numbers. The first emergency period has been the most significant in this respect: A ban on leaving residences was in place for a certain time, so visiting the forest was not possible.

Looking at the year 2020, it can be said that during the Covid epidemic waves, due to the lack of foreign guests and domestic guests arriving only for one day, the number of tourists in general has decreased by about half. However, in the area of forest tourism, which is part of active tourism, something completely different was found.

In 2020, based on visitor data from the lookout towers, there was also a decline in the spring months (Figure 2) during the first epidemiological emergency period: this was when there were the fewest visitors compared to other years.
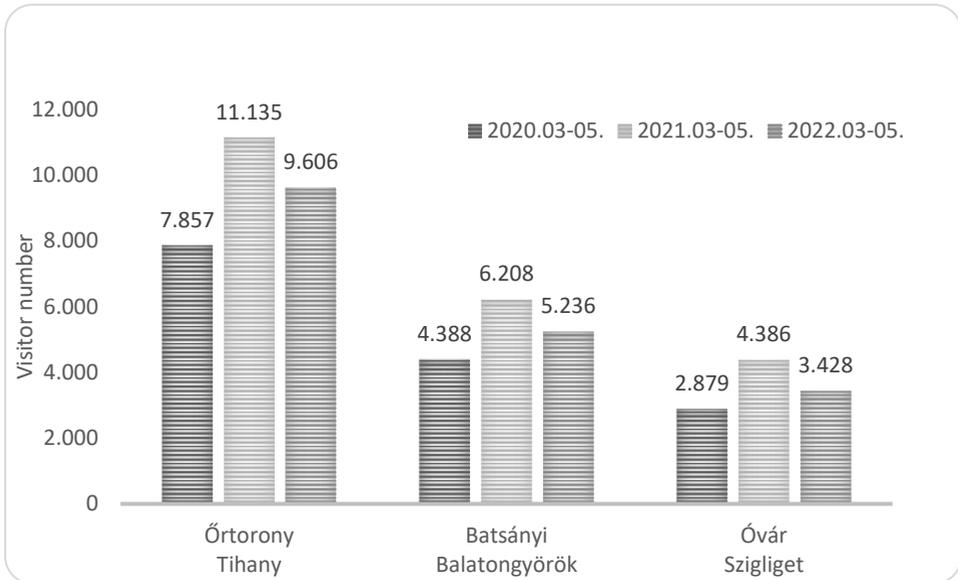
Figure 2. Visitor numbers of the spring months (March, April and May).

However, the total number of visitors in summer months was the highest in 2020 (Figure 3), moreover, the annual total number of visitors was the highest as well in 2020 (Figure 1.), with one exception: Batsányi lookout tower, year-round data, where 2021 was the maximum. Subsequently, the cumulated visitor numbers of the three lookout towers in 2021 are barely noticeably less (- 3.1%), while in 2022 they are significantly (- 21%) below the figures of 2020, which supports the national trend

This kind of rapid change in demands for hiking is not suitable for valuing trends of forest tourism in the long term. Therefore, formation of real demand-based conclusions can only be interpreted within the framework of further research in forest tourism. The fact that visiting the forest was an obvious and self-evident answer during the Covid restrictions must be considered and hence, the data must be scrutinized carefully (see Conclusions).
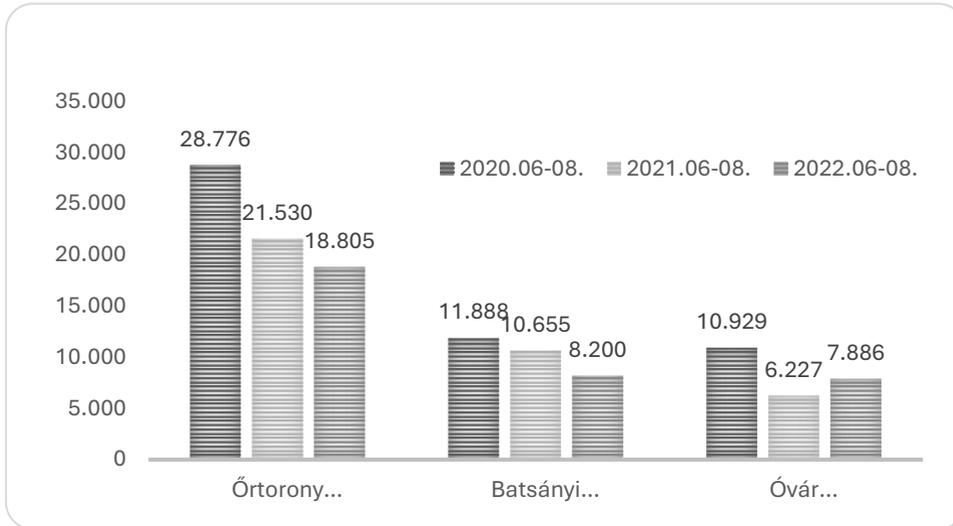
Figure 3. Visitor numbers of the summer months (June, July and August)

(record number of visitors in 2020 in Hungary) also in the operational area of Bakonyerdő Ltd.

Conclusions

Summing up the data, conclusions can be drawn that in 2020, there was a surprising dichotomy. Of the three years studied, the summer months with most visits and the overall year 2020 had the highest number of visitors, while the spring months (i.e., the part of the year that fell on the Covid emergency period) had the fewest visitors. This was clearly due to the temporary introduction of a curfew, called lockdown. The upward trend in visitor numbers during the first year of Covid (2020) stopped as early as the following year. In 2021, the numbers decreased barely noticeably, but in 2022 they fell sharply (Figure 1). Possible explanations may include:

- New entrants to active tourism did not remain regular forest hikers after 2020.
- For the greater part of 2022, it was already possible to travel to most countries with less restrictions or without restrictions, so foreign trips postponed for two years due to Covid taking place at this time, at the expense of domestic holidays and day trips to the forest.
- The weather extremes of 2022 (warmth, drought) scared away forest visitors.

Examining the data, it can be clearly established that most of the new entrants to forest tourism chose hiking due to the restrictions, as it was the only way to spend their free time. Many chose this pastime precisely because they wanted to actively contribute to the preservation of their health during the Covid era. The decline in numbers in 2022

can be traced back to several reasons, but it must stated that the vast majority of new entrants did not remain forest visitors. These numbers are not yet suitable for determining medium-term prognoses, so further research is needed to be carried out in 2023-2024. to be able to draw further conclusions from the data obtained in this way.

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CONCLUDING REMARKS
COMMUNICATION – A NEGLECTED TOPIC IN HIGHER FORESTRY EDUCATION AND FURTHER EDUCATION?

NORBERT WEBER

Although coined many years ago, Paul Watzlawick's famous quote "You cannot not communicate!" is still valid today. Especially forest owners and forest managers working in forests around urban agglomerations need to explain explicitly to the public what they are (not) doing, including *why* and *how* they do it. In some countries, the role of foresters as stewards for the ecosystem is increasingly contested. That is why graduates need to be equipped with the respective communication skills, including aspects of conflict management. Are higher education institutions in forestry prepared for that challenge? Should communication be established as a new discipline in the forestry curricula? And, in a wider sense, can forest pedagogy at schools help to arouse interest in forestry and to foster acceptance and trust towards forestry professionals?

As is often the case, the answer to questions like these is "well, it depends". The Sopron SILVA Network conference showed many examples of well-advanced approaches of professionalization of communication with regard to forest topics, occurring at campuses, in schools and in the forests themselves. Last not least, due to innovations of sensor technologies, trees and forests increasingly "communicate" with scientists by delivering real-time data about their growth and health state.

In addition to lecturers' and students' views, the perspective of PR specialists with a core competency in communication provided insights about paradigm shifts in communication contents and styles. Communication today is challenging due to a higher sequence of messages and number of channels, thus necessitating so-called multichannel and even omnichannel activities. There are a lot of opportunities for communication between forest-people and "non-experts", starting from everyday contacts to guided tours in the forests and tree planting activities. Crisis communication is key, it should even begin before a 'cold' conflict becomes a 'hot' one. With regard to the contents, trustworthy stories about the role of forests and forestry for society have to be told. But how should future foresters communicate – rationalistic or emotional? Indeed there are indications that communication with a non-forestry audience needs "emotional experts".

What about communication on campus? Communication patterns between students and lecturers have been changing substantially during recent decades, partly driven by advances in information and communication technologies. Although some

universities in Europe still rely on strong hierarchical relationships, there is more and more two-way communication in the lecture halls. Students are not only giving feedback by evaluating lectures, they are also involved in co-designing curricula and syllabi. Finally, with regard to the question about the role of communication as a stand-alone subject in forestry curricula: Depending on the national situation and the resources available at the respective universities, different solutions might be expedient. As curriculum development often is a medium and long-term issue, in a short term perspective lecturers should use offers of further education and external experts should be invited on a guest lecturer basis.

In any way, professionally dealing with communication is worth it. The contributions of SILVA Annual Conference in Sopron demonstrated that communication is not generally a neglected topic in higher forestry education. However, depending on the starting position of the particular institutions, continuous improvements or even new approaches are necessary. To end with a famous quote attributed to Jack Westoby: "Forestry is not about trees, it is about people".

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COMMUNICATION
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