

E+ FOREE TOOLBOX

Digital skills for forest education



ERASMUS+ Project
2022-1-AT01-KA220-VET-000089296
FOREE – Digital Skills for Forest Education

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Forestry-related contents and competencies

Forestry operators are skilled professionals dedicated to the sustainable management of forests. They possess expertise in forest ecology, silviculture, and harvesting techniques. Proficient in utilising specialised machinery and tools, they execute precise tree felling, logging, and transportation operations while prioritising safety and minimizing environmental impact. Understanding forest regulations, land management, and conservation practices is essential for compliance and sustainable resource utilisation. Effective communication, adaptability, and problem-solving abilities are inherent traits, enabling them to navigate the complexities of the industry and collaborate with diverse stakeholders for the overall health and productivity of forested ecosystems.

Such competencies are developed during forestry operators' courses at any level. The E+ FOREE Project analysed the main categories of forestry-related competencies identifying how and which digital technologies can be integrated in the process of knowledge transfer.



Health & Safety during forest operations

Description

Forestry-related work is recognised as one of the heaviest and most dangerous, as it is continuously exposed to various risks and a high probability of accidents. The chainsaw represents the most dangerous tool and felling the phase of greatest risk, even if the greatest number of injuries occur during the preparation of the timber. Safety management is, therefore, a complex operation that needs to be managed at various levels: from the identification and assessment of risks to the planning and organisation of activities to the adoption of adequate working techniques, the necessary safety devices and an emergency management plan.

In Italy, the fundamental rule is Legislative Decree 81/2008 on health and safety in the workplace, to which are added the State-Regions agreements relating to the "Compulsory training of workers" and "Equipment" and the Regional Law 4 /2009, "Management and economic promotion of forests", with its implementing regulations, in particular the forest regulation and that of the Register of forestry companies.

Learning outcomes

To acquire basic knowledge on risks, safety measures, criteria for the use of individual protective devices and safe working methods for ordinary situations.

To know the maintenance operations and the basic rules for the safe use of tools and machinery.

Competencies

Knowledge: Knowledge of the risks and dangers associated with fieldwork and the techniques and work procedures appropriate to prevent these risks;

Skills: Ability to carry out preventive analysis of specific risks for individual construction sites and repeated for each work operation, to plan and organise activities, to adopt adequate working techniques and necessary safety devices and to draw up a plan for emergency management;

Attitude: Performance and coordination of activities for the safety of oneself and others.

Examples of topics and activities

Occupational health and safety, prevention of accidents, emergency management, environmental legislation and forestry; safety rules on the use of the chainsaw in various activities in the forest; personal protective equipment (PPE) and chainsaw protection devices; safety in forestry operational sites; safety standards in logging activities for by land; risk assessment and protective devices; first aid basics; organization of the construction site for aerial logging e sector legislation; safety aspects relating to the aerial logging; etc.

Examples of applicability of digital technologies to the forestry education contents

Teleconferencing

The section dedicated to training on 'Health and safety in forestry sites' can be offered through live online sessions using online video conferencing platforms. Advantages: The lesson is delivered in real-time and allows interaction between student and instructor; there are no costs for accommodation and food for the student since he can follow from a place of his preference. Cons: need for proper internet connection.

Audience Engagement Platform

Audience engagement platforms can be used to fix some of the content during their delivery. For instance, breaking the teaching time with quizzes of short questionnaires or games can be useful to refresh the attention of the audience and highlight some of the important contents relating to health and safety during forest operations. It is more advisable to implement such tools when not in the field to avoid distraction or, if in the field, only when the conditions are safe.

Video editing

To illustrate some procedures or to demonstrate any mistakes and consequences of an incorrect approach to practices in the forest, it is possible to create short videos

that integrate traditional training, contributing with visual material and, therefore, more effective in communicating scenarios that otherwise would not be possible to see and understand.

Existing use case example: <https://youtu.be/dNFt2dEworo>

Chat and live box

During the delivery of the forest training course, mainly if it envisages a blended approach or if the trainees are not gathered in the same place, tools such as chat and live boxes can help keep in contact, share information, create contents-related conversation channels, or compartmentalise the discussion on certain topics. I.e., in a chat system, it could be possible to gather doubts and questions from the trainees after a live session or during the delivery of an asynchronous online course about how to make a risk assessment for the worksite.

Online Content Sharing

Materials concerning the regulations in force on health and safety in forestry sites, as well as images, videos and texts of other kinds (i.e., handouts, summaries, articles, etc.), can be shared on dedicated online platforms. Advantages: material available as long as you access the platform, ability to update materials to the most up-to-date versions. Disadvantages: familiarity with online platforms is required, and sometimes a subscription is required.

Learning Management System

The section dedicated to training on 'Health and safety in forestry sites' can be offered through e-learning courses, MOOCs or other types of asynchronous teaching strategies developed through Learning Management Systems. Advantages: The lesson contents can be viewed multiple times and the trainee can progress to the learning at his/her own pace; there are no costs for accommodation and food for the student since she/he can follow from a place of his/her preference.

Cons: need for a proper internet connection; there might be costs to host the online course contents.

Existing use case example:

<https://www.elfopiemonte.it/moodle/>

Content Management System

The presentation of the contents as well as many of the contents can be published as online pages and websites that can be developed through the use of a Content Management System.

Technical Apps

Technical apps can be developed to offer field support during the risk assessment phase and to record the main information in case of an emergency in the forest.

Existing use case example:

<https://www.safeforestry.co.uk/safe-forestry-app/>

Virtual whiteboarding tools

Virtual whiteboarding tools can be used to fix some of the contents during their delivery. For instance, breaking the teaching time with quizzes or asking for inputs from the trainees can help to refresh the attention of the audience and highlight some of the important contents relating to health and safety during forest operations. It is more advisable to implement such tools when not in the field in order to avoid distraction or, if in the field, only when the conditions are safe.

Organisation & Coordination of forest operations

Description

Forestry operations need a phase of planning and scheduling. A sound organisation and coordination of the activities ensures the safety and efficiency of the forestry-related work. Most of the forest training courses entail a section dedicated to the teaching of making operation plans, definition of roles and responsibilities, as well as preliminary surveys on the worksite, in order to assess risks and opportunities of the practices.

Learning outcomes

To be able to plan and schedule the phases of the forestry operations in the field, in order to allow for a safe and efficient management of the activities.

Competencies

Knowledge: Knowledge of the phases and procedures entailed in the forest operations;

Skills: Ability to organise and manage activities and define the roles of co-workers and make an exhaustive worksite plan;

Attitude: Every action on the field is preceded by a planning phase and all the components are defined.

Examples of topics and activities

Reading and interpretation of the site plan and organization of the worksite; site organization and working methods; logging with winch on forestry tractor; concentration with motor winch; stacking of small and medium-sized timber; basic knowledge of ropes and their maintenance; organization of the construction site for aerial logging; aerial logging: areas of use, advantages, typologies, cartography basics, choice of line, use of the compass, land survey, land profile drawing, line sizing, etc.

Examples of applicability of digital technologies to the forestry education contents:

Teleconferencing

All the operations to be carried out in the woods must be planned and organised previously, in order to avoid risks of unforeseen issues and to make them more efficient the activities. Most of the forest education courses, therefore, include a theoretical part to teach reading and interpretation of the site plan and organization of the work site, with a focus on the site organization and working methods. Being a theoretical part, some of the contents related to the organisation and coordination of the forest operations can be delivered through teleconferencing tools during real-time seminars, for instance. Pros: videoconferences make more efficient the delivery of the theoretical part of the course, reducing costs and simplifying practical organization; Cons: Videoconferencing will miss the possibility to possibility of gaining direct experience of operations in the forest

Audience Engagement Platform

During the organisation and coordination of the forest operations all the roles, the instruments, the spaces and the timing have to be clear and well-defined in advance. When delivering organisation and coordination-related content it is important to report all the different cases and options that should be considered. The use of Audience engagement platforms can be helpful when it is needed to make a checklist of the important features for the organisation and coordination of a forest worksite or when the trainer wants to make sure that the most important contents are understood and fixed.

Video editing

Videos showing how to make a field survey previously the start of the worksite or illustrating through animated infographics the organisation, implementation and management of the fieldwork can be useful while delivering content related to the coordination of forest

operations, in order to make clearer the activities that must be carried out in such phase.

Existing use case example:

<https://www.youtube.com/watch?v=QzbNvbbXP0g>

Chat and live box

During the delivery of the forest training course, mainly if it envisages a blended approach or if the trainees are not gathered in the same place, tools such as chat and live boxes can help keep in contact, share information, create content-related conversation channels or compartmentalise the discussion on certain topics. I.e., in a chat system, it could be possible to gather doubts and questions from the trainees after a live session or during the delivery of an asynchronous online course about how to make a preliminary survey of the worksite to plan harvesting activities.

Online Content Sharing

Materials such as the plan of the worksite, the harvesting plan, the preliminary field survey checklist, case study documents, or even multimedia can be uploaded on an online content-sharing platform in order to avoid taking up too much space in the mailboxes of trainers and trainees. The trainees can upload their results of the organisational phase exercises online so that the trainer can keep track of their progress.

Learning Management System

Some of the contents related to the organisation and coordination of the forest operations (i.e. how to make a preliminary survey of the worksite, how to plan and draw a cable crane system for logs extraction, identification of the main tools and machinery to be used according to the situation, etc.) can be summarised and delivered in online courses. Pros: planning an online course helps to be more comprehensive and to include all the contents that during a face-to-face lecture might be neglected because of time

and resources; Cons: Using only Learning Management Systems for the development of content related to the organisation and coordination of forest operations will miss the possibility to possibility of gaining direct experience of operations in the forest.

Existing use case example:

<https://www.elfopiemonte.it/moodle/>

Content Management System

The presentation of the contents as well as many of the contents can be published as online pages and websites that can be developed through the use of a Content Management System.

Technical Apps

A technical app can be a tool to help data log on-site activities as well as ongoing processes. It can help the forest operator to check how you are managing your site respecting all the due principles.

Existing use case example:

<https://www.safeforestry.co.uk/safe-forestry-app/>

Virtual whiteboarding tools

During the organisation and coordination of the forest operations all the roles, the instruments, the spaces and the timing have to be clear and well-defined in advance. When delivering organisation and coordination-related content it is important to report all the different cases and options that should be considered. The use of virtual whiteboarding tools can be helpful when it is needed to make a checklist of the important features for the organisation and coordination of a forest worksite or when the trainer wants to make sure that the most important contents are understood and fixed.

Operativity in the forest sector

Description

The implementation of forest operation entails an array of actions and activities of which any single detail must be mastered by the workers on site. Forest training courses have the objective of describing, explaining, and allowing the students to replicate such activities in the field. All the processes, the phases, the roles and responsibilities of the workers on site and the tools and machinery to use have to be clearly defined to ensure safe and efficient operations in the forest.

Learning outcomes

To know the details entailed in the several phases of forest operations and how to implement them in the correct way.

Competencies

Knowledge: Knowledge of the phases and procedures entailed in the forest operations;

Skills: Ability to organise and manage activities and define the roles of co-workers and make an exhaustive worksite plan;

Attitude: Every action on the field is preceded by a planning phase and all the components are defined.

Examples of topics and activities

Cutting of conifers, cutting of broadleaves; cutting of small plants; cutting of plants in normal conditions, cutting of plants in non-normal conditions (i.e., plants on declivities, with branches caught by the neighbouring plants, etc.); branch removal and log cutting and selection; cutting and preparation of big sized plants; harvesting through forestry tractors and machines; assembly, operation and disassembly of a traditional cableway (winch on sled); assembly, operation and dismantling of a cableway with mobile drive station; assembly, operation and dismantling of mini cableways; assembly, operation and disassembly of a mobile drive station with self-moving carriage; etc.

Examples of applicability of digital technologies to the forestry education contents:

Teleconferencing

Some of the topics can be presented and explained online during a live session through a videoconferencing platform. Through the use of some of the additional functionalities it is possible to share the screen to show videos or other explanatory material of the forestry operations (i.e. video previously recorded on the techniques of cutting for certain tree species), but also use the whiteboard to sketch the forest operation procedures (i.e. sketching the direction of fall of the tree once cut). Pros: Using videoconferencing to integrate the teaching of contents related to the operativity in the forest can help the trainees to be more prepared during the face-to-face phase in the field. Cons: Practical experience is missing. Existing use case example: <https://www.dinamica-fp.com/catalogo/qualificazione-professionale-e-sicurezza-per-il-settore-forestale-tecniche-di-abbattimento-allestimento-e-certificazione/>

Video editing

Videos taken during practical phases of forest operations can be shown to the trainees in order to quickly and more simply demonstrate different cases and situations that can be encountered during the activities in the forest. For instance, to show an array of cases of tree cutting according to the tree species, the tree status or the site conditions it is possible to make some videos and show them in succession to give a comprehensive idea of the applicable forest operations.

Chat and live box

During the delivery of the forest training course, mainly if it envisages a blended approach or if the trainees are not gathered in the same place, tools such as chat and live boxes can help keep in contact, share information, create contents-related conversation channels, or

compartmentalise the discussion on certain topics. I.e., in a chat system, it could be possible to gather doubts and questions from the trainees after a live session or during the delivery of an asynchronous online course about how to perform a cut adequate to the worksite conditions and the tree species and status.

Online Content Sharing

The teaching material used for the lecture or possible multimedia used to illustrate better the practices in the forest can be easily uploaded online on dedicated platforms so that all the trainees included in the shared folder can access, view and revise the material when needed.

Learning Management System

Some of the topics can be presented and explained in online courses developed through Learning Management Systems. Many LMS allow for the embedding of videos and other multimedia in order to help the trainee visualise the contents while keeping his/her attention up. Pros: Using LMS to integrate the teaching of contents related to operativity in the forest can help the trainees to be more prepared during the face-to-face phase in the field. Cons: Practical experience is missing if the practical part is not delivered additionally.

Existing use case example:

<https://www.elfopiemonte.it/moodle/>

Content Management System

The presentation of the contents as well as many of the contents can be published as online pages and websites that can be developed through the use of a Content Management System.

Technical Apps

Technical Apps can help perform activities in the field, as they can facilitate, accelerate, and digitalise some processes, such as measurement of plants, identification of species, collection and stocking of data, spatial analysis, etc.

An example in the forest sector:

<https://www.tech4effect.eu/efficiency-portal/>

Forest Legislation and Normative Matter

Description

Forestry laws govern activities in designated forest lands, with respect to forest management and timber harvesting. Forestry laws generally adopt management policies for public forest resources, such as multiple use and sustained yield. Forest management is split between private and public management, with public forests being sovereign property of the State. Forestry laws are now considered an international affair. People working in the sector of forestry and forest operations must have a solid knowledge of the local, national and European legislation in force in the area where they work, in order to ensure compliance and safety of all the activities during the implementation phase.

Learning outcomes

To gain critical awareness of basic concepts of forest law in order to be able to manage the professional activities, by taking responsibility for decision making in the work environment.

Competencies

Knowledge: Basic knowledge of the local, national and European forest law;

Skills: Ability to plan and perform forest operations in compliance with the legislation in force;

Attitude: Decision-making process in the forest is driven by the awareness of forest law and rules.

Examples of topics and activities

Forestry and environmental legislation, administrative procedures; safety legislation; legislation on equipment and machines; responsibilities and duties; administrative procedures for buying and selling lots; laws at the local, national and European levels; etc.

Examples of applicability of digital technologies to the forestry education contents:

Teleconferencing

Forest law-related topics are predominantly theoretical and normally delivered during classroom-based lectures. Therefore, they can all be potentially delivered through live sessions on videoconferencing. Pros: videoconferences make more efficient the delivery of the theoretical part of the course, reducing costs and simplifying practical organisation. Cons: need for functioning internet connection.

Audience Engagement Platform

Theoretical complex contents might be difficult to deliver despite the topic is fundamental, there is the risk that the contents are delivered in an ineffective way, which can cause the training to fall flat. Audience engagement platforms can support the memorisation of the main topics, through interactive activities (i.e., proposing a break during the presentation to invite the trainees to a multiple-choice quiz on the main articles of the national forest law that can be accessed via a web browser or app). Pros: contributes to fixing the main topics and keeps the attention of the trainees high even on the most theoretical contents. Cons: requires previous preparation of the interactive activities.

Video editing

Presentations and infographics can be edited in the form of a video, in order to maintain a captivating and illustrated storytelling, helping the viewer (i.e., the trainee) to visualise the different components of the forest law that drive forest operations. A voiceover recording illustrating the pictures and the slides can help to keep the attention and further explain the topics on video.

Audio Editing

Forest law-related content can be delivered through podcasts or audio recordings of voice narration. Such a tool allows the trainee to learn about the topics of such sector without obliging to pay attention to a screen, Specific podcasts could be recorded on ad hoc cases or in-depth analysis.

Chat and live box

During the delivery of the forest training course, mainly if it envisages a blended approach or if the trainees are not gathered in the same place, tools such as chat and live boxes can help keep in contact, share information, create contents-related conversation channels or compartmentalise the discussion on certain topics. I.e., in a chat system, it could be possible to gather doubts and questions from the trainees after a live session or during the delivery of an asynchronous online course about where to find the most updated forest laws at the European level.

Online Content Sharing

The documents of the laws and all the related annexes can be shared with the trainees using online content-sharing platforms, in order not to send heavy emails and be able to update the contents when needed. Moreover, if there are any presentations or additional materials regarding the topic of forest legislation it is possible to upload them to the platform and make them available to the trainees.

Learning Management System

Forest law-related topics are predominantly theoretical and normally delivered during classroom-based lectures. Therefore, they can all be potentially delivered through live sessions on videoconferencing. Pros: videoconferences make more efficient the delivery of the

theoretical part of the course, reducing costs and simplifying practical organisation. Cons: need for functioning internet connection.

Existing use case example:

<https://www.elfopiemonte.it/moodle/>

Content Management System

The presentation of the contents as well as many of the contents can be published as online pages and websites that can be developed through the use of a Content Management System.

Virtual whiteboarding tools

Theoretical complex contents might be difficult to deliver despite the topic is fundamental, there is the risk that the contents are delivered in an ineffective way, which can cause the training to fall flat. Virtual whiteboarding tools can support the memorisation of the main topics, through interactive activities (i.e., proposing a break during the presentation to invite the trainees to report on a shared board their own experiences or level of understanding).

Pros: contributes to fixing the main topics and keeps high the attention of the trainees even on the most theoretical contents. Cons: requires previous preparation of the interactive activities.

Environment & Sustainability in the forest sector

Description

A complex network of regulations addresses directly or indirectly forest conservation and sustainable forest resources utilisation in areas such as environmental protection, nature and landscape conservation, water protection, fishery, and wildlife conservation. Significant trends in country specific forestry legislation include sustainable forest management, forest management planning, stakeholder involvement, advice and support to private forestry, government financial support to forestry, harmonisation with forestry related policies and legislation, and protection against forest fires. The forest operation activities must follow certain procedures to ensure the sustainability of the activities, avoiding or reducing as much as possible the impacts on the environment. Therefore, the use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality, and their potential to fulfil, now and in the future, relevant ecological, economic, and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.

Learning outcomes

To know which are the sustainable forest management requirements and how to adapt forest operations to the characteristics of the worksite in order to avoid or reduce the impact on the surrounding environment.

Competencies

Knowledge: Knowledge of the risks and dangers associated with fieldwork and the techniques and work procedures appropriate to prevent these risks;

Skills: Ability to carry out preventive analysis of the impact of the forest operations and to adopt adequate working techniques and necessary strategies to avoid or reduce impacts on the environment;

Attitude: Performs and coordinates activities for the safety of plants and wildlife in the surroundings.

Examples of topics and activities

Ecological functions and value of forests; phyto- and zoocenosis of the region/area of intervention; Elements of Environmental Impact Assessment procedures; analysis of the environmental risks related to the use of tools and machinery in the forest; best practices of sustainable forest management; etc.

Examples of applicability of digital technologies to the forestry education contents:

Teleconferencing

Basic contents on the environmental sustainability of forest operations are mainly theoretical, and, therefore, most of them can be delivered through videoconferencing live sessions. The additional functions of videoconferencing can help with showing different conditions and study cases that could be of interest to the future professional activity of the trainees. Pros: videoconferences make more efficient the delivery of the theoretical part of the course, reducing costs and simplifying practical organisation. Cons: need for a functioning internet connection, practical exercise of environmental assessment needs to be integrated into the face-to-face part.

Audience Engagement Platform

Topics like sustainability in the forest sector and environmental-related issues of forest operations can be very wide and complex. Interactive activities can help summarise the most important points of the delivered contents while livening up the lecture (i.e. generate a word cloud to summarise key takeaways). Pros: contributes to fixing the main topics and keeps the attention of the trainees high even on the most theoretical contents. Cons: requires previous preparation of the interactive activities.

Video editing

Videos of the damages or the consequences of the wrong implementation of forestry activities can help the trainee to understand the reason behind the adoption of certain measures.

Moreover, videos showing how to implement the best practices in the forest allow us to visualise a wide array of options for the correct implementation of the field techniques. Finally, a video showing the components of forest habitat important for biodiversity conservation can help the trainee during the phase of preliminary environmental survey and assessment in the field.

Existing use case example: <https://youtu.be/IRudkN9sM20>

Audio Editing

Environment and sustainability-related content can be delivered through podcasts or audio recordings of voice narration. Such tools allow the trainee to learn about the topics of such sector without obliging to pay attention to a screen, Specific podcasts could be recorded on ad hoc cases or in-depth analysis.

Chat and live box

During the delivery of the forest training course, mainly if it envisages a blended approach or if the trainees are not gathered in the same place, tools such as chat and live boxes can help keep in contact, share information, create content-related conversation channels, or compartmentalise the discussion on certain topics. I.e. in a chat system, it could be possible to gather doubts and questions from the trainees after a live session or during the delivery of an asynchronous online course about how to identify tree-related microhabitats that should be protected during the harvesting phase.

Online Content Sharing

Reports, publications, or manuals that can integrate the lectures and the teaching material on the environment and sustainability-related topics can be shared as additional documents on online platforms. Such material can be updated and integrated easily both by the trainer and the trainees, contributing to building up a community of professionals sharing content and knowledge.

Learning Management System

Basic contents on the environmental sustainability of forest operations are mainly theoretical, and, therefore, most of them can be delivered through prepared online courses. The additional functions of LMS can help with showing different conditions or study cases that could be of interest to the future professional activity of the trainees. Pros: the use of LMS for the development of online content makes more efficient the delivery of the theoretical part of the course, reducing costs and simplifying practical organisation. Cons: need for a functioning internet connection, practical exercise of environmental assessment needs to be integrated into the face-to-face part.

Existing use case example:

<https://www.elfopiemonte.it/moodle/>

Content Management System

The presentation of the contents as well as many of the contents can be published as online pages and websites that can be developed through the use of a Content Management System.

Technical Apps

Technical apps can be developed to offer field support for identifying biodiversity-relevant components in the worksite, as well as to deliver a catalogue of the possible elements to consider while carrying out forest operations and as a checklist to help control if all the important phases for the environmental sustainability management are respected.

Existing use case example: <https://informar.eu/tree-microhabitats>

virtual whiteboarding tools

Topics like sustainability in the forest sector and environmental-related issues of forest operations can be very wide and complex. Interactive activities can help summarise the most important points of the delivered contents while livening up the lecture (i.e., generate a board where each trainee can post his/her own key takeaways of the lecture). Pros: contributes to fixing the main topics and keeps the attention of the trainees high even on the most theoretical contents. Cons: requires previous preparation of the interactive activities.

Digital technologies' categories

Integrating digital technologies into forestry education is pivotal for preparing future professionals. These tools offer interactive learning experiences, simulating real-world scenarios and fostering a deeper understanding of forest management. For instance, video production allows for dynamic visual storytelling, presenting complex concepts with clarity and engaging students effectively. Online lectures provide accessibility and flexibility, enabling learners to tailor their study schedules. Moreover, interactive platforms foster discussion, collaboration, and knowledge sharing among students globally, enriching their perspectives. These technologies mirror the digital landscape of the professional world, preparing students for seamless integration into the forestry industry. Ultimately, embracing digital tools enhances engagement, knowledge retention, and overall educational quality, ensuring a skilled and tech-savvy forestry workforce. The E+ FOREE Project identified 10 categories of digital technologies and analysed their application to the forest education sector.



Audience Engagement Platform

Description

Audience engagement platforms enable participants to interact with live questions on a device and receive real-time responses during in-person and online events. Audience engagement tools, also called audience interaction platforms, are software presenters can use to interact with and engage their audience in real time through live polling, quizzes, surveys, or Q&A sessions. Audience engagement tools are a great way to make it easier for people to talk to each other, creating a sense of community, and get people interested in what the trainer is teaching. It can help keep the conversation going between the presenter and the audience, allowing a space for feedback and insights, and make it easier for people to comprehend and retain the presented information.

Competencies

Knowledge: Get familiar with most of the audience engagement platforms currently available and how they work;

Skills: Ability to use at least one audience engagement platform, to set up and share quizzes, polls or interactive games;

Attitude: Apply audience engagement platforms' features to the most appropriate content and manage to involve participants in the interactive activity.

Use cases according to the forestry education contents

Health & Safety

Audience engagement platforms can be used to fix some of the content during their delivery. For instance, breaking the teaching time with quizzes or short questionnaires or games can be useful to refresh the attention of the audience and highlight some of the important contents relating to health and safety during forest operations. Obviously, it is more advisable to implement such tools when not in the field in order to avoid distraction or, if in the field, only when the conditions are safe.

Organization & Coordination

During the organisation and coordination of the forest operations all the roles, the instruments, the spaces, and the timing must be clear and well-defined in advance. When delivering organisation and coordination-related content it is important to report all the different cases and options that should be considered. The use of Audience engagement platforms can be helpful when it is needed to make a checklist of the important features for the organisation and coordination of a forest worksite or when the trainer wants to make sure that the most important contents are understood and fixed.

Legislation & Normative matters

Theoretical complex contents might be difficult to deliver despite the topic is fundamental, there is the risk that the contents are delivered in an ineffective way, which can cause the training to fall flat. Audience engagement platforms can support the memorisation of the main topics, through interactive activities (i.e., proposing a break during the presentation to invite the trainees to a multiple-choice quiz on the main articles of the national forest law that can be accessed via a web browser or app). Pros: contributes to fixing the main topics and keeps the attention of the trainees high even on the most theoretical contents. Cons: requires previous preparation of the interactive activities.

Environment & Sustainability

Topics like sustainability in the forest sector and environmental-related issues of forest operations can be very wide and complex. Interactive activities can help summarise the most important points of the delivered contents while livening up the lecture (i.e. generate a word cloud to summarise key takeaways). Pros: contributes to fixing the main topics and keeps the attention of the trainees high even on the most theoretical contents. Cons: requires previous preparation of the interactive activities.

Audio Editing

Description

Audio editing is the process of manipulating sound recordings. This can be done for many reasons, such as to improve the quality of the recording, to remove unwanted noise or sounds, or to change the length or pitch of a particular audio clip. Among audio editing outputs, there are podcasts, interviews, or promotional audio.

Competencies

Knowledge: Get familiar with most of the audio editing software currently available and how they work;

Skills: Ability to use at least one audio editing software, to set up and edit short audios on content-related to forest education;

Attitude: Apply audio editing to enrich the teaching offer, producing audios according to the principal audio recording and editing criteria and applying the to the most appropriate content.

Use cases according to the forestry education contents

Legislation & Normative matters

Forest law-related content can be delivered through podcast or audio recordings of voice narration. Such a tool allows the trainees to learn about the topics of such a sector without obliging them to pay attention to a screen. Specific podcasts could be recorded on ad hoc cases or in-depth analyses.

Environment & Sustainability

Environment and sustainability-related content can be delivered through podcasts or audio recordings of voice narration. Such a tool allows the trainees to learn about the topics of such a sector without obliging them to pay attention to a screen. Specific podcasts could be recorded on ad hoc cases or in-depth analyses.

Chat and live box

Description

This category includes messaging and communication apps and cloud-based team collaboration softwares which allow business messaging, call, organise video meetings and share files. Such tools enable local and remote workers to collaborate on content in real time and near-real time across different devices, including laptops and mobile devices. At the core of chat-based collaborative workspaces are features such as group and individual messaging with threaded and persistent conversations, allowing for remote collaboration.

Competencies

Knowledge: Get familiar with how such tools are structured and work;

Skills: Ability to use at least one chat-based collaborative workspace (main features);

Attitude: Use of the tools for everyday communication with colleagues and other participants to the activities, applying the different features to the needs of the group and the contents to be communicated.

Use cases according to the forestry education contents

Health & Safety

During the delivery of the forest training course, mainly if it envisages a blended approach or if the trainees are not gathered in the same place, tools such as chat and live boxes can help keep in contact, share information, create content-related conversation channels, or compartmentalise the discussion on certain topics. They allow to collect doubts and questions from the trainees after a live session or during the delivery of an asynchronous online course about how to make a risk assessment for the worksite.

Organisation & Coordination

During the delivery of the forest training course, mainly if it envisages a blended approach or if the trainees are not gathered in the same place, tools such as chat and live boxes can help keep in contact, share information, create content-related conversation channels, or compartmentalise the discussion on certain topics. They allow to collect doubts and questions from the trainees after a live session or during the delivery of an asynchronous online course about how to make a preliminary survey of the worksite to plan harvesting activities.

Operativity in the forest

During the delivery of the forest training course, mainly if it envisages a blended approach or if the trainees are not gathered in the same place, tools such as chat and live boxes can help keep in contact, share information, create content-related conversation channels, or compartmentalise the discussion on certain topics. They allow to collect doubts and questions from the trainees after a live session or during the delivery of an asynchronous online course about how to perform a cut adequate to the worksite conditions and the tree species and status.

Legislation & Normative matters

During the delivery of the forest training course, mainly if it envisages a blended approach or if the trainees are not gathered in the same place, tools such as chat and live boxes can help keep in contact, share information, create content-related conversation channels or compartmentalise the discussion on certain topics. They allow to collect doubts and questions from the trainees after a live session or during the delivery of an asynchronous online course about where to find the most updated forest laws at the European level.

Environment & Sustainability

Tools such as chat and live boxes can help keep in contact, share information, create content-related conversation channels or compartmentalise the discussion on certain topics. They allow the collection of doubts and questions from the trainees after a live session or during the delivery of an asynchronous online course about how to identify tree-related microhabitats that should be protected during the harvesting phase.

Content Management System (CMS)

Description

A content management system (CMS) is software that helps users create, manage, and modify content on a website without the need for technical knowledge. In other words, a CMS lets you build a website or web pages without needing to write code from scratch (or even know how to code at all). The content management system handles all that basic infrastructure stuff for you so that you can focus on more forward-facing parts of your website. Beyond websites, you can also find content management systems for other functions – like document management.

Competencies

Knowledge: Get familiar with the main CMS available and how they work;

Skills: Ability to use at least one CMS available, to set up, develop and publish a basic webpage or website;

Attitude: Use CMS to organise and deliver information online in relation to the forestry education contents, using also the additional functionalities of the system.

Use cases according to the forestry education contents

Alle the contents

The presentation of the contents can be published as online pages and websites that can be developed through the use of a Content Management System.

Learning Management System (LMS)

Description

A learning management system is a software application or web-based technology used to plan, implement, and assess a specific learning process. It's used for e-learning practices and, in its most common form, consists of two elements: a server that performs the base functionality and a user interface (UI) that is operated by instructors, students and administrators. Primarily used for knowledge management: the gathering, organizing, sharing and analysis of an organization's knowledge in terms of resources, documents, and people skills, the role of the LMS varies according to the organization's training strategy and goals.

Competencies

Knowledge: Get familiar with most of the LMS tools currently available and how they work;

Skills: Ability to use at least one LMS option available, to set up and deliver a basic online training course within the LMS;

Attitude: Use LMS in the most appropriate activities and be able to manage an online training course, using the additional functionalities of the system.

Use cases according to the forestry education contents

Health & Safety

The section dedicated to training on 'Health and safety in forestry sites' can be offered through e-learning courses, MOOCs, or other types of asynchronous teaching strategies developed through Learning Management Systems. Advantages: The lesson contents can be viewed multiple times and the trainee can progress to the learning at his/her own pace; there are no costs for accommodation and food for the student since she/he can follow from a place of his/her preference. Cons: need for a proper internet connection; there might be costs to host the online course contents.

An existing example in forest education sector:

<https://www.elfopiemonte.it/moodle/>

Organisation & Coordination

Some of the contents related to the organisation and coordination of the forest operations (i.e. how to make a preliminary survey of the worksite, how to plan and draw a cable crane system for logs extraction, identification of the main tools and machinery to be used according to the situation, etc.) can be summarised and delivered in online courses. Pros: planning an online course helps to be more comprehensive and include all the contents that during a face-to-face lecture might be neglected because of time and resources; Cons: Using only Learning Management Systems for the development of contents related to the organisation and coordination of forest operations will miss the possibility to possibility of gain direct experience of operations in the forest.

An existing example in forest education sector:

<https://www.elfopiemonte.it/moodle/>

Operativity in the forest

Some of the topics can be presented and explained in online courses developed through Learning Management Systems. Many LMS allow for the embedding of videos and other multimedia in order to help the trainee visualise the contents while keeping his/her attention up. Pros: Using LMS to integrate the teaching of contents related to the operativity in the forest can help the trainees to be more prepared during the face-to-face phase in the field. Cons: Practical experience is missing if the practical part is not delivered additionally.

An existing example in forest education sector:

<https://www.elfopiemonte.it/moodle/>

Legislation & Normative matters

Forest law-related topics are predominantly theoretical and normally delivered during classroom-based lectures. Therefore, they can all be potentially delivered through live sessions on videoconferencing.

Pros: videoconferences make more efficient the delivery of the theoretical part of the course, reducing costs and simplifying practical organisation. Cons: need for functioning internet connection.

An existing example in forest education sector:
<https://www.elfopiemonte.it/moodle/>

Environment & Sustainability

Basic contents on the environmental sustainability of forest operations are mainly theoretical, and, therefore, most of them can be delivered through prepared online courses. The additional functions of LMS can help with showing different conditions or study cases that could be of interest to the future professional activity of the trainees. Pros: the use of LMS for the development of online content makes more efficient the delivery of the theoretical part of the course, reducing costs and simplifying practical organisation. Cons: need for a functioning internet connection, practical exercise of environmental assessment needs to be integrated into the face-to-face part.

An existing example in forest education sector:
<https://www.elfopiemonte.it/moodle/>

Online Content Sharing

Description

These platforms offer online cloud storage options that include file sharing, synchronization across multiple devices, and collaboration features. Most offer desktop and mobile applications, where users can also upload, store, sync, and share files via a web browser.

Competencies

Knowledge: Get familiar with the structure and functioning of such categories of tools;

Skills: Ability to use at least one online content sharing platform;

Attitude: Use of the tools for sharing files, and materials and collaborating on certain documents and folders in the frame of the topic of interest.

Use cases according to the forestry education contents

Health & Safety

Materials concerning the regulations in force on health and safety in forestry sites, as well as images, videos, and texts of other kinds (i.e., handouts, summaries, articles, etc.), can be shared on dedicated online platforms. Advantages: material available as long as you access the platform, ability to update materials to the most up-to-date versions. Disadvantages: familiarity with online platforms is required, and sometimes subscription is required.

Organisation & Coordination

Materials such as the plan of the worksite, the harvesting plan, the preliminary field survey checklist, case study documents, or even multimedia can be uploaded on online content sharing platforms in order to avoid taking up too much space in the mailboxes of trainers and trainees. The trainees can upload their results of the organisational phase exercises online so that the trainer can keep track of their progress.

Operativity in the forest

The teaching material used for the lecture or possible multimedia used to illustrate better the practices in the forest can be easily uploaded online on dedicated platforms so that all the trainees included in the shared folder can access, view and revise the material when needed.

Legislation & Normative matters

The documents of the laws and all the related annexes can be shared with the trainees using online content sharing platforms, in order not to send heavy emails and be able to update the contents when needed. Moreover, if there are any presentations or additional materials regarding the topic of forest legislation it is possible to upload them to the platform and make them available to the trainees.

Environment & Sustainability

Reports, publications, or manuals that can integrate the lectures and the teaching material on the environment and sustainability-related topics can be shared as additional documents on online platforms. Such material can be updated and integrated easily both by the trainer and the trainees, contributing to building up a community of professionals sharing content and knowledge.

Technical Apps & Tools

Description

App is an abbreviated form of the word "application." An application is a software program that is designed to perform a specific function directly for the user or, in some cases, for another application program. Developed for both mobile devices or computers, technical apps provide useful tools in relation to different topics and sectors. Within the forest education sector technical apps might regard topics like safety techniques and tools, guidelines to operate in the forest, field guide to plant and animal species, etc.

Competencies

Knowledge: Aware of the existence of technical apps available to enrich the activities and support practices;

Skills: Ability to use at least one technical app during both theoretical and practical activities in the forest;

Attitude: Use of Apps to report data, store information and improve forest-related activities.

Use cases according to the forestry education contents

Health & Safety

Technical apps can be developed to offer field support during the risk assessment phase and to record the main information in case of an emergency in the forest.

An existing example in the forest sector:

<https://www.safeforestry.co.uk/safe-forestry-app/>;

<https://www.youtube.com/watch?v=xbjiIPHThcQ>

Organisation & Coordination

A technical app can be a tool to help data log on-site activities as well as ongoing processes. It can help the forest operator to check how you are managing your site respecting all the due principles.

An existing example in the forest sector:

<https://www.tech4effect.eu/efficiency-portal/>

Operativity in the forest

Technical Apps can help perform activities in the field, as they can facilitate, accelerate, and digitalise some processes, such as measurement of plants, identification of species, collection and stocking of data, spatial analysis, etc.

An example in the forest sector:

<https://www.tech4effect.eu/efficiency-portal/>

Environment & Sustainability

Technical apps can be developed to offer field support for identifying biodiversity-relevant components in the worksite, as well as to deliver a catalogue of the possible elements to consider while carrying out forest operations and as a checklist to help control if all the important phases for environmental sustainability management are respected.

An existing example in the forest sector:

<https://informar.eu/tree-microhabitats>

Teleconferencing

Description

A system with video cameras connected via the internet or via a special connection so that people in different places can see and communicate with each other, without the need to travel and meet in the same place. Video conferencing stability and quality may vary with the speed and reliability of your data connection. There are several ways you can conduct video conferences, such as using your smartphone, tablet, or desktop computer.

Competencies

Knowledge: Get familiar with most of the video conferencing tools currently available and how they work;

Skills: Ability to use at least one videoconferencing platform, to organise online meetings and to use some of the ancillary tools (i.e., chat, quiz, whiteboard, etc.);

Attitude: Apply videoconferencing to the most appropriate activities and convey information in a way appropriate to the type of platform and environment.

Use cases according to the forestry education contents

Health & Safety

The section dedicated to training on 'Health and safety in forestry sites' can be offered through live online sessions using online video conferencing platforms.

Advantages: The lesson is delivered in real-time and allows interaction between student and instructor; there are no costs for accommodation and food for the student since he can follow from a place of his preference. **Criticalities:** need for proper internet connection.

Organization & Coordination

All the operations to be carried out in the woods must be planned and organised previously, to avoid risks of unforeseen issues and to make the activities more efficient.

Most of the forest education courses, therefore, include a theoretical part to teach reading and interpretation of the site plan and organization of the work site, with a focus on the site organization and working methods. Being a theoretical part, some of the contents related to the organisation and coordination of the forest operations can be delivered through teleconferencing tools during real-time seminars, for instance. Advantages: videoconferences make more efficient the delivery of the theoretical part of the course, reducing costs and simplifying practical organization; Criticalities: Videoconferencing will miss the possibility to possibility of gaining direct experience of operations in the forest.

Operativity in the forest

Some of the topics can be presented and explained online during a live session through a videoconferencing platform. Through the use of some of the additional functionalities it is possible to share the screen to show videos or other explanatory material of the forestry operations (i.e., video previously recorded on the techniques of cutting for certain tree species), but also use the whiteboard to sketch the forest operation procedures (i.e., sketching the direction of fall of the tree once cut). Advantages: Using videoconferencing to integrate the teaching of contents related to operativity in the forest can help the trainees to be more prepared during the face-to-face phase in the field. Criticalities: Practical experience is missing

An existing example in the forest training sector:

<https://www.dinamica-fp.com/catalogo/qualificazione-professionale-e-sicurezza-per-il-settore-forestale-tecniche-di-abbattimento-allestimento-e-certificazione/>

Legislation & Normative matters

Forest law-related topics are predominantly theoretical and normally delivered during classroom-based lectures. Therefore, they can all be potentially delivered through live sessions on videoconferencing.

Advantages: videoconferences make the delivery of the theoretical part of the course more efficient, reducing costs and simplifying practical organisation. Criticalities: need for functioning internet connection.

Environment & Sustainability

Basic contents on the environmental sustainability of forest operations are mainly theoretical, and, therefore, most of them can be delivered through a videoconferencing live sessions. The additional functions of videoconferencing can help with showing different conditions of study cases that could be of interest to the future professional activity of the trainees. Advantages: videoconferences make the delivery of the theoretical part of the course more efficient, reducing costs and simplifying practical organisation. Criticalities: the need for a functioning internet connection, and practical exercise of environmental assessment needs to be integrated into the face-to-face part.

Video Editing

Description

Video editing is the manipulation and arrangement of video shots. Video editing is used to structure and present all video information and it is now affordable and available for everyone since, in recent years, editing software has been developed for personal computers and mobile devices, with simplified features and properties to make video editing simple and user-friendly.

Competencies

Knowledge: Get familiar with most of the video editing software currently available and how they work;

Skills: Ability to use at least one video editing software, to set up and edit short informational videos;

Attitude: Apply video editing to enrich the teaching offer, producing videos according to the principle video making and editing criteria and applying the to the most appropriate content.

Use cases according to the forestry education contents

Health & Safety

To illustrate some procedures or to demonstrate any mistakes and consequences of an incorrect approach to practices in the forest, it is possible to create short videos that integrate traditional training, contributing with visual material and, therefore, more effective in communicating scenarios that otherwise would not be possible to see and understand.

An existing example in the forest education sector:
<https://www.youtube.com/watch?v=THljZ5BWQ6k>

Organization & Coordination

Videos showing how to make a field survey previously the start if the worksite or illustrating through animated infographics the organisation, implementation and management of the fieldwork can be useful while

delivering contents related to the coordination of forest operation, in order to make clearer the activities that must be carried out in such phase.

An existing example in the forest education sector:

<https://www.youtube.com/watch?v=dnTy-ZYliXE&t=17s>

Operativity in the forest

Videos taken during practical phases of forest operations can be shown to the trainees in order to quickly and more simply demonstrate different cases and situations that can be encountered during the activities in the forest. For instance, to show an array of cases of tree cutting according to the tree species, the tree status or the site conditions it is possible to make some videos and show them in succession to give a comprehensive idea of the applicable forest operations.

Legislation & Normative matters

Presentations and infographics can be edited in the form of a video, in order to maintain a captivating and illustrated storytelling, helping the viewer (i.e., the trainee) to visualise the different components of the forest law that drive forest operations. A voiceover recording illustrating the pictures and the slides can help to keep the attention and further explain the topics on video.

Environment & Sustainability

Videos of the damages or the consequences of the wrong implementation of forestry activities can help the trainee understand the reason behind the adoption of certain measures. Moreover, videos showing how to implement the best practices in the forest allow to visualise a wide array of options for the correct implementation of the field techniques. Finally, a video showing the components of forest habitat important for biodiversity conservation can help the trainee during the phase of preliminary environmental survey and assessment in the field.

Virtual Whiteboarding Tools

Description

A virtual whiteboard is a blank digital space where multiple people can write, share, and interact with each other in real-time. The virtual whiteboard has become a key piece of technology in remote groups, ensuring they can still work together on tasks such as brainstorming, problem-solving, writing and designing creative projects, allowing for visual collaboration, which speeds up and simplifies teamwork dynamics. Virtual whiteboarding tools help during the phases of brainstorming, designing processes, problem-solving, and consolidating concepts and contents.

Competencies

Knowledge: Get familiar with the main virtual whiteboarding tools available and how they work;

Skills: Ability to use at least one virtual whiteboarding tool available and engage a group with its features;

Attitude: Apply virtual whiteboarding tools to share content within forest education courses supporting all the participants to take part in the activities.

Use cases according to the forestry education contents

Health & Safety

Virtual whiteboarding tools can be used to fix some of the contents during their delivery. For instance, breaking the teaching time with quizzes or asking for inputs from the trainees can help to refresh the attention of the audience and highlight some of the important contents relating to health and safety during forest operations. Obviously, it is more advisable to implement such tools when not in the field in order to avoid distraction or, if in the field, only when the conditions are safe.

Organisation & Coordination

During the organisation and coordination of the forest operations all the roles, the instruments, the spaces, and the timing must be clear and well-defined in advance. When delivering organisation and coordination-related content it is important to report all the different cases and options that should be considered. The use of virtual whiteboarding tools can be helpful when it is needed to make a checklist of the important features for the organisation and coordination of a forest worksite or when the trainer wants to make sure that the most important contents are understood and fixed.

Legislation & Normative matters

Theoretical complex contents might be difficult to deliver despite the topic is fundamental, there is the risk that the contents are delivered in an ineffective way, which can cause the training to fall flat. Virtual whiteboarding tools can support the memorisation of the main topics, through interactive activities (i.e., proposing a break during the presentation to invite the trainees to report on a shared board their own experiences or level of understanding). Pros: contributes to fixing the main topics and keeps the attention of the trainees high even on the most theoretical contents. Cons: requires previous preparation of the interactive activities.

Environment & Sustainability

Topics like sustainability in the forest sector and environmental-related issues of forest operations can be very wide and complex. Interactive activities can help summarise the most important points of the delivered contents while livening up the lecture (i.e., generate a board where each trainee can post his/her own key takeaways of the lecture). Pros: contributes to fixing the main topics and keeps the attention of the trainees high even on the most theoretical contents. Cons: requires previous preparation of the interactive activities.

Digital Learning Activities

The integration of digital learning activities in the forestry education sector revolutionizes traditional teaching methods and amplifies interactive learning. Through online platforms, students collaborate in virtual teams, sharing insights, and collectively solving problems. This fosters a sense of community and replicates real-world cooperation within the industry. Students gain exposure to diverse perspectives, refining their decision-making and communication skills. It's a progressive approach that cultivates teamwork, crucial for addressing complex challenges in sustainable forest management. This shift embraces technological advancements and enriches the educational experience, preparing future foresters for collaborative success and for adapting to an evolving industry.

The E+ FOREE Project identified 22 collaborative digital learning activities which can be applied in the forest education sector, reporting use case scenarios and existing best practices.



Clickers

Description

Clickers activity, also known as classroom response systems or audience response systems, involves using electronic devices or "clickers" to collect real-time responses from participants during class. Clickers can be used to engage participants in quizzes, polls, and interactive discussions related to the topic of interest. The trainer projects a multiple-choice question onto the classroom's shared screen or presentation. Without consulting a peer, students use the link to the app or tool to respond to the question. The platform turns the responses into a bar graph showing the distribution of the answers. The trainer shares the bar chart on the screen for the students to consider. In the second phase, the trainer projects the same question, but this time asks students to discuss it in small groups for a few minutes (break out rooms or other instruments to allow for separated group meetings). The trainees use the platform management app link to again respond to the question. The trainer shares the new bar graph and explains what the correct response is and why. This activity leverages peer instruction: students explain their reasoning to each other and learn from each other (studies have shown that peer instruction does help students learn). The clickers help to "gamify" the activity, making it more enjoyable for students. The results of the second bar graph can help the trainer decide what to do next: he/she can briefly explain the relevance or responses suggesting additional material to read or consult about it. This activity works best when it's done recurrently in a class: the instructor briefly explains a concept, then does the clicker activity as described above, then briefly explains the next concept, then does another clicker activity, and so on. Typically, in an hour-long class, a trainer might ask three to five clicker questions.

Learning outcomes

- Reinforce theoretical concepts and principles by providing opportunities to practice and apply knowledge in real-time scenarios.

Competencies

- Apply their knowledge to practical scenarios, demonstrating their understanding of the main taught concepts.
- Develop data analysis skills while interpreting the results of clickers activities, gaining insights into performance and learning progress.
- Ability to make informed decisions based on an understanding of forestry concepts, principles, and management strategies.
- Improve information retention, as active participation and immediate feedback help reinforce learning outcomes.
- Interact with the content and each other, fostering a dynamic and participatory learning environment.

Through clicker activity participants actively engage with the subject matter, deepen their understanding of the concepts of interest, and develop essential competencies that are relevant to their future roles as professionals. The immediate feedback and interactive nature of clickers activities contribute to a more effective and enjoyable learning experience, enhancing participation and knowledge retention.

- **Topic-related Knowledge:** Participants will deepen their understanding of various concepts.
- **Critical Thinking:** Participants will develop critical thinking skills as they analyse questions, apply their knowledge, and make informed choices in response to clicker prompts.
- **Active Participation:** Participants will participate actively, engaging with the subject matter and providing immediate feedback.
- **Data Interpretation:** Analysing clicker-generated data can help participants interpret information, identify patterns, and draw conclusions related to forest-related topics.

Use case in the forestry education sector

- **Time Management:** Using clickers requires participants to manage their time effectively to provide responses within the given time frame, enhancing their time management skills.

Example activity:

Topic: Prioritisation of actions during forest operations.
Use a digital polling platform accessible to all students.

Present a series of multiple-choice and true/false questions related to the organisation and coordination of forestry operations. Include questions on harvesting techniques, preliminary field survey, check of the materials and instruments; and health and safety actions. Each question should have a time limit to encourage quick thinking and prevent outside assistance. Participants will respond to each question using the digital polling platform, providing their answers within the given time frame. Display the results in real-time, showing the distribution of responses for each question. After each question, provide immediate feedback to the class. Discuss the correct answer and explain the reasoning behind it.

Address common misconceptions and use the opportunity to reinforce key concepts related to forestry operations organisation and coordination.

Encourage participants to discuss challenging questions or concepts after the quiz. Facilitate an interactive discussion to promote peer learning and understanding.

Summarise the results of the clickers quiz, highlighting areas of strength and potential areas for improvement in the participants' understanding of the topic. Such activity can, in fact, be led as a reinforcement of the key messages at the end of a lecture.

As a possible follow-up activity, provide additional resources or reading materials on specific topics that students found challenging during the quiz.

Category/ies of digital technologies implemented

Teleconferencing
Chat and live box

Example of digital tools that can be applied

Google Meet, Zoom, Jitsi, Teams, Slack, Discord, etc.

Cumulative brainstorming

Description

Cumulative brainstorming is a learning activity where students generate ideas related to a specific topic in a structured and cumulative manner. Each participant adds to the list of ideas contributed by their peers. The trainer writes a different issue, question, or problem onto four or five shared slides or blank canvas, and then shares them among the trainees' groups. The trainer asks the participants to form groups of about five members each (break out rooms or other instruments to allow for separated group meetings). Each group works first on one single shared blank file/whiteboard and for three or four minutes they jot down some ideas pertaining to the issue that is written on it. Each group then 'rotates' around to the next input, and they jot down their ideas pertaining to that issue. They can add new ideas, they can propose counterpoints to the ideas written by the previous group, or they can endorse an idea written down by the previous group by putting a checkmark beside it. They can work on shared files (such as on an online shared file or on a virtual whiteboard slide).

The groups keep rotating from file/whiteboard to file/whiteboard until each group has commented on all the issues. Each group then returns to its original focus and assesses or synthesises what has been written there. A member from each group reports back to the class.

This collaborative activity promotes deep learning by encouraging students to build on or critique each other's ideas.

Cumulative brainstorming can also be done in a small group: each student in the group jots down an idea pertaining to a different problem or issue. Each student then hands the link to the file/whiteboard to another student, who adds an idea or comment. This continues until all the students have commented on all the topics/sections.

Learning outcomes

- Achieve a comprehensive understanding of various topics by exploring multiple perspectives and innovative ideas.
- Analyse and evaluate different ideas, identifying strengths, weaknesses, and potential solutions.
- Develop empathy and perspective-taking skills, appreciating diverse viewpoints and understanding the complexities of forest operations challenges.
- Engage in reflective learning, analysing the list of ideas and considering the insights gained during the collaborative process.

Competencies

Through the cumulative brainstorming activity participants actively participate in a dynamic and inclusive learning experience, contributing to a comprehensive exploration of the topics of interest. This approach enhances critical thinking, creativity, communication, and interdisciplinary understanding, empowering participants to become informed professionals.

- **Problem-Solving:** Participants engage in problem-solving as they explore and propose solutions to forest operation challenges through the generation of ideas.
- **Collaboration and Teamwork:** The activity promotes collaboration and teamwork as participants work together to create a comprehensive list of ideas related to the chosen forestry topic.
- **Communication Skills:** By actively participating in cumulative brainstorming, participants enhance their communication skills, expressing their thoughts effectively and respectfully.
- **Creativity and Innovation:** Cumulative brainstorming encourages participants to think creatively and generate innovative perspectives related to forest operations.

Use case in the forestry education sector

Example activity:

Topic: Best practices for the maintenance of forest operations tools and pieces of machinery.

After dividing the class into small groups, assign to each of them an instrument or machine that is used during forest operations. Give each group a few minutes to generate an initial list of sustainable forest operations practices or strategies.

Encourage participants to think creatively and consider all the possible aspects entailed. After the initial idea generation, rotate the groups so that each group joins a new group.

In the new groups, each participant shares the ideas from their previous group, adding them to the ongoing cumulative brainstorming list. In the new groups, participants continue to expand on the list of ideas, adding their own suggestions and building upon the contributions of others. Emphasise the importance of active listening and respecting all ideas during the process. Bring the class back together and present the comprehensive list of maintenance best practices of forestry tools and pieces of machinery generated through cumulative brainstorming.

Category/ies of digital technologies implemented

Teleconferencing
Audience engagement platform
Chat and live box
Virtual whiteboarding tools

Example of digital tools that can be applied

Zoom, Google Meet, Slack, Padlet, Mural, Discord, Teams, etc.

Digital mind mapping

Description

Mind Mapping is a technique that supports learning, improves information recording, shows how different facts and ideas are related, and enhances creative problem-solving. Mind mapping can also help visualise the organisation of lesson plans and contents. Digital mind maps can be requested as an output from the students or can be designed and delivered by the trainer to set up the organisation of the forest operation in the field or report the step-by-step processes of how to perform an activity.

Learning outcomes

- Be able to synthesise the take-home messages of complex topics.
- Present their mind maps to peers, showcasing their ability to effectively communicate complex concepts through visual representations.
- Propose solutions to real-world challenges in the topics of interest

Competencies

The digital mind mapping learning activity will not only enhance participants' knowledge but also cultivate critical thinking and collaborative skills, allowing them to approach challenges with innovative and well-informed solutions.

- **Digital Literacy:** Participants will develop proficiency in using mind mapping software to create, organise, and present information related to forest operations and management effectively.
- **Critical Thinking:** Participants will analyse complex forest management concepts and practices, discerning the interconnections between different aspects of sustainable forestry.
- **Data Synthesis:** Participants will gather and synthesise information from various sources, integrating it into their mind maps to create a comprehensive and coherent representation of forest operations.
- **Communication Skills:** Participants will effectively communicate their knowledge and understanding of forest operations through visually engaging and well-structured mind maps.

Use case in the forestry education sector

- **Problem-Solving:** Participants will use mind mapping to brainstorm potential solutions to challenges in forest operations, addressing ecological, social, and economic considerations.
- **Environmental Awareness:** Participants will recognise the importance of sustainable forest management practices in mitigating environmental impacts and conserving forest ecosystems.
- **Collaborative Learning:** Participants will engage in group mind mapping activities, fostering teamwork and the exchange of ideas and perspectives.

Example activity:

Participants will have to create a comprehensive digital mind map that explores and reports the several passages that are entailed during the forest operations plan design. The activity will consist of starting with a common passage or topic and developing the further steps of the procedure branching out subtopics that correspond to successive passages or important considerations.

Participants' outputs can be assessed according to the depth of information, organisation, and visual representation of concepts related to forest operations while evaluating their ability to explain the interconnectedness of the topics they have reported.

Category/ies of digital technologies implemented

Teleconferencing
Audience engagement platform
Chat and live box
Virtual whiteboarding tools

Example of digital tools that can be applied

Zoom, Google Meet, Slack, Padlet, Mural, Discord, Teams, etc.

Dotmocracy

Description

Dotmocracy is a participatory learning activity where participants use dots (stickers or markers) to vote on ideas, priorities, or solutions presented on a board or chart. In the 'live' version of this activity, the trainer discusses an issue or case study with participants until they have generated a handful of different perspectives or preferences. The trainer writes each perspective onto a large sheet of paper and hangs each sheet in a different part of the classroom. The trainer gives each participant five (or so) sticky dots and the participants walk to each sheet to allocate their dots according to how strongly they support a given perspective: if they totally support one perspective, they can put all of their dots on that sheet; if they support several perspectives, they can place two sticky dots on one sheet and three on another, or even one sticky dot on each sheet. Participants visually assess the distribution of sticky dots. The distribution of sticky dots represents the opinion of the class as a whole and can be used as a prompt for further discussion, or as a way of narrowing down which perspectives will receive further attention in class. Such activity can be done during online live sessions using audience engagement platform tools, which allow for live polling and expression of opinions. The trainer needs to set up the poll with the different options and share the link to the trainees so that they can participate and select their preference.

Learning outcomes

- Achieve the ability to prioritise concepts, practices, or ideas based on the collective preferences of the group. The process will also facilitate consensus-building among participants.
- Adopt a respectful discourse approach, since participants are encouraged to listen to diverse viewpoints and engage in constructive debates.
- Gain insights into various stakeholder perspectives, recognising the importance of considering multiple viewpoints in decision-making.
- Reflect on the results and the reasons behind their voting choices, encouraging self-assessment and critical reflection.

Competencies

- **Critical Thinking:** The dotmocracy activity fosters critical thinking as participants evaluate and prioritise different ideas or solutions, considering their feasibility and potential impact during forest operations.
- **Decision-Making:** Through voting on forest-related ideas and proposals, participants will develop decision-making skills, considering different factors and stakeholders' perspectives.
- **Active Participation:** The dotmocracy activity promotes active participation and engagement, encouraging participants to contribute their opinions and preferences in a structured and inclusive manner (and also anonymously, to foster the participation of the more introverts).
- **Collaboration and Communication:** Participants will collaborate with their peers during the dotmocracy process, engaging in discussions and communicating their rationale for voting on specific ideas.

Use case in the forestry education sector

Example activity:

Dotmocracy for analysing the risks and hazard checklist of a forest operation case study.

Provide the participants with a common forest operations risk checklist in a virtual whiteboard platform or using an online polling instrument. On the side of each entry of the checklist they have to add a sticker according to the level of severity they think that risk would have in the context of the analysed use case. Once the polling is finished or once every participant votes/puts his virtual sticker on the selected entry, the participants can explain their choices and the debate can start. Compare and contrast the practices that received the most votes and discuss the reasons behind their popularity. Facilitate a consensus-building discussion to identify the most essential issues to consider when filling a risk assessment plan. Have the class collectively agree on a set of priority risks and a risk evaluation table.

Category/ies of digital technologies implemented

Conclude the activity with a reflection session where participants can individually or in groups discuss what they learned from the dotmocracy process and the importance of collaborative decision-making in risk assessment of forest operations.

Teleconferencing
Audience engagement platform
Chat and live box

Example of digital tools that can be applied

Zoom polls, Mentimeter, Kahoot, etc.

Fishbowl

Description

Fishbowl digital learning activity is a collaborative and interactive online exercise. Participants are divided into two groups: inner circle and outer circle. Inner circle engages in a discussion or task, while the outer circle observes silently. Roles switch after a set time. It fosters critical thinking, active listening, and diverse perspectives. This format suits virtual classrooms, enabling inclusive participation and deeper comprehension.

In the 'live' version of this activity, the trainer asks for one or more volunteers from the class to step forward to perform a given task. The task might be a physical procedure or an analytic activity such as debating the pros and cons of an issue. As the group of volunteers engage in the task (in a virtual "fishbowl"), the other participants observe, taking notes or assessing their performance. The trainer can ask the observing participants to focus on specific aspects or, if it is a physical procedure, the trainer might ask the observing participants to identify ways that the task could be performed more effectively, or simply differently. After the participants in the fishbowl have completed their task, the other participants report on what they observed or what they learned from watching. The fishbowl activity works well in large classes where it might not be possible for everyone to engage in the same task: the participants in the fishbowl act as proxy learners for their peers. The observing participants learn not by doing the task but by reflecting on how the task is being done.

Learning outcomes

- Exhibit analytical thinking skills, analysing practical scenarios and making informed decisions based on actual considerations.
- Improve communication skills, conveying complex forestry concepts and ideas effectively to peers.
- Enhance active listening and information synthesis abilities, summarising and integrating key points from the fishbowl discussion.
- Reflect on the fishbowl discussion, their own participation, and the insights gained, facilitating deeper learning and self-awareness.

Competencies

- Fishbowl learning activity can be a valuable instructional approach to explore complex topics. The fishbowl learning activity not only imparts knowledge and critical thinking but also nurtures communication and collaboration skills, empowering participants to become informed and better communicators.
- Critical Thinking: The fishbowl activity encourages participants to analyse and evaluate different forest operations scenarios, management strategies, and harvesting techniques, fostering critical thinking and problem-solving skills.
- Active Listening: Participants in the outer circle will practice active listening, paying close attention to the discussion in the fishbowl, taking notes, and summarising key points to gain a deeper understanding of the topics discussed.
- Communication and Presentation: Participants in the inner circle will develop effective communication and presentation skills as they articulate their ideas, provide evidence to support their arguments, and respond to questions from their peers in a clear and organised manner.
- Collaboration and Teamwork: The activity promotes collaboration and teamwork as participants in the inner circle work together to present different perspectives and engage in respectful dialogue, while those in the outer circle collaborate to capture relevant information.
- Empathy and Perspective Taking: Participants will develop empathy and perspective-taking skills as they consider diverse viewpoints on forestry issues, recognising the complexities and trade-offs involved in the topics of interest.

Use case in the forestry education sector

Example activity:

Virtually, or online, the instructed task can be recorded as a video (i.e. procedure of how to cut a tree or remove branches from a fallen tree before logging it). A video recorded simply through a smartphone by a peer or the trainer him/herself could help to better visualise the way to perform the activity, saving time and making the learning process more effective. The participant can explain why he performed in a certain way, while the observers can analyse the strengths and weaknesses of his/her performance.

Category/ies of digital technologies implemented

Teleconferencing

Video editing

Chat and live box

Example of digital tools that can be applied

Camtasia, Pinnacle, Zoom, Slack, Teams, Google Meet, etc.

Group Processing

Description

Group processing learning activity involves participants working collaboratively in groups to reflect on their learning experiences, share insights, and enhance their understanding of forestry-related concepts and skills. The primary goal of group processing is to foster critical thinking, effective communication, and teamwork, all of which are essential for future forestry professionals. Group processing is an activity that can be introduced at the end of lectures, or as an extension of group assignments or tasks, just asking participants to give each other feedback on how they worked together, one by one. Specifically, it is good to ask them, to share what the group member did well, what they need to work on, what they could have done differently.

Learning outcomes

- Be able to identify both the strengths and weaknesses of the collaborative process and dynamics.
- Engage in discussions about the roles and contributions of each group member, ensuring a fair distribution of tasks and responsibilities.
- Collaboratively establish action plans to address any challenges or issues identified during the group processing session, working toward improvement.
- Apply the constructive feedback received during the group processing activity to improve their future group work experiences.
- Reflect on the effectiveness of their group's communication and decision-making processes, seeking ways to enhance group dynamics.
- Interiorise the approach of collaborative work and open mindset.

Competencies

Through the Group Processing learning activity, participants develop competences in self-reflection, active listening, providing constructive feedback, conflict resolution, and collaboration, while achieving learning outcomes related to identifying strengths and weaknesses, discussing group roles, setting action plans, reflecting on

group dynamics, and applying feedback for personal and group growth. The activity fosters a positive and supportive learning environment, encouraging participants to become more effective team members and communicators.

- **Research and Information Evaluation:** Participants will practice researching and gathering information to support the pros and cons they identify, learning to assess the credibility and relevance of their sources.
- **Analysis and Synthesis:** Participants will analyse the collected information and synthesize it into coherent arguments for the pro and con aspects of the topic, presenting well-reasoned points.
- **Critical Thinking:** Participants will develop critical thinking skills by analysing and evaluating the various advantages and disadvantages of the topic, considering different perspectives and implications.
- **Communication:** Participants will improve their communication skills by expressing their ideas clearly and concisely when presenting the pro-con arguments to their peers.
- **Growth Mindset:** Participants will embrace the belief that skills and collaboration can be developed and refined over time encouraging individuals to seek opportunities for growth.
- **Positive attitude and mindset:** Participants will develop the willingness to engage in reflective discussions, the openness to giving and receiving feedback, and the commitment to working collaboratively to improve group dynamics and performance.

Use case in the forestry education sector

Example activity:

Topic: Designing and presenting a group project. The topic can be to design a harvesting plan when each group is given a different work site or a different technique to implement.

After completing a group project, the participants gather in their respective groups for the Group Processing activity.

The trainer encourages each participant to share their thoughts and feelings about the group project experience, focusing on communication, collaboration, and individual contributions. Each group member provides feedback to their peers, highlighting areas where the group performed well and suggesting improvements for future projects. The group engages in a discussion to address any conflicts or disagreements that arose during the project, working together to find resolutions. Based on the reflections and feedback, the group creates an action plan to enhance their teamwork and communication for future projects. Finally, the trainer leads a whole-class discussion, allowing groups to share their key takeaways from the Group Processing activity and any changes they plan to implement in their future collaborative work.

Category/ies of digital technologies implemented

Teleconferencing
Chat and live box
Online content sharing
Learning Management System
Virtual whiteboarding tools

Example of digital tools that can be applied

Zoom, Slack, Teams, Google Meet, Google Drive, Dropbox, Moodle, etc.

Jigsaw

Description

Jigsaw learning is a cooperative learning strategy where students work in small groups to become experts on specific topics and then teach their findings to their peers in new groups. Organising a jigsaw activity is a five-step process: Divide the class into 'expert' groups of four to six learners (keeping the groups the same size as far as possible). Give each group a letter, or a colour, or other name. Then ask the learners within each group to number themselves one to four (or one to six).

Give each group a section of text or information (this can be in pictorial form). The group should spend some time reading, discussing, and helping each other to understand the text or information. For a more in-depth activity, the group may use ICT and reference books to further research a sub-topic. Learners, who are now 'experts' on the own section of text or information, then move into 'jigsaw' groups, with a shared number, i.e., all the number one's work in a group, all the number twos work in another group, etc. Each 'expert' learner in turn shares with their 'jigsaw' group the section of text or information they were originally given. The others ask questions to ensure all have a good understanding. The 'jigsaw' group together complete a task which requires them to understand all of the information shared by each 'expert'. This could be anything that requires each learner to contribute their piece of expert knowledge: filling in a grid or table, completing a diagram, designing a poster, devising a role play. The grouping can be done, in online live sessions, through the instruments that allow for the creation of break out rooms or separated virtual space where the group members can gather and participate in the activity.

Learning outcomes

- Critically analyse the assigned topics and consider the broader implications.
- Recognise the interdisciplinary nature of most of the issues that can be encountered in everyday work-related life.

Competencies

- Apply knowledge to real-world scenarios, enhancing the ability to apply theoretical concepts.
- Develop empathy and perspective-taking skills, appreciating the diverse viewpoints and expertise within the field of forestry.
- Build confidence in public speaking and presenting complex information.

Through the jigsaw learning activity, participants become active learners, working collaboratively to acquire in-depth knowledge on specific topics while also gaining insights into other related areas. This cooperative learning approach enhances critical thinking, communication skills, and interdisciplinary understanding, all of which are crucial for future professionals.

- **Collaboration and Teamwork:** The jigsaw learning activity fosters collaboration and teamwork as participants work together within their expert groups to master their assigned topics and later share their knowledge with new groups.
- **Information Synthesis:** Participants develop skills in synthesising complex information as they research, organise, and present their findings to their peers in a coherent and structured manner.
- **Communication Skills:** By teaching their peers in the new groups, participants will enhance their communication skills, articulating forestry concepts effectively and responding to questions and feedback.
- **Active Listening:** During the presentations by other expert groups, participants will practise active listening, absorbing information, and gaining insights from their peers' expertise.
- **Collaboration appreciation:** learn to include others' perspectives and suggestions in everyday work.

Use case in the forestry education sector

Example activity:

Lectures on forest law and normative matter can be monotonous. Introducing the jigsaw activity and assigning to groups/participants different laws or normative details to analyse and present to their peers would help to make the lecture more dynamic and interesting, fostering a deeper understanding of the topics and helping fix the most important points. Each group/participant will analyse and deepen the aspects of one legislative topic and present it to his/her peers after which a confrontation can start where all the participants can comment on the applicability of such law and then draw some conclusions in relation to the influence it may have on practical activities during forest operations.

Category/ies of digital technologies implemented

Teleconferencing
Chat and live box
Online content sharing

Example of digital tools that can be applied

Google Meet, Zoom, Jitsi, Teams, Slack, Discord, etc.

Learning roles

Description

The 'Learning Roles' learning activity in forestry education is a collaborative and interactive approach that assigns specific roles to participants within a group to enhance their learning experience. Each role comes with unique responsibilities and tasks, contributing to a well-rounded understanding of a forestry-related topic. This activity encourages active engagement, critical thinking, and cooperation among participants.

Learning outcomes

- Demonstrate effective leadership and teamwork skills within their assigned roles, contributing to a cohesive and productive learning group.
- Develop effective communication skills, such as articulating ideas clearly, actively listening to others, and fostering meaningful discussions.
- Apply analytical and critical thinking skills to analyse information, solve problems, and make informed decisions relevant to their roles.
- Develop proficiency in managing time and prioritizing tasks to ensure timely completion of learning activities.
- Experience the benefits of collaborative learning, recognizing how different roles contribute to a shared understanding and success.

Competencies

- **Active Listening:** Participants assigned roles involving listening to others' perspectives or summarising discussions will practice active listening skills to understand and reflect on shared ideas.
- **Critical Thinking:** Participants in roles that involve analysing information or evaluating solutions will develop their critical thinking abilities to assess and make informed decisions.
- **Leadership:** Participants assigned leadership roles will develop competencies in guiding and coordinating group activities, ensuring everyone stays on track and focused on the learning objectives.

Use case in the forestry education sector

- **Teamwork:** Participants will develop the ability to work in groups and with different stakeholders, welcoming peers' contributions and understanding the distribution of responsibilities.
- **Communication:** Participants in roles that require facilitating discussions or presenting information will improve their communication skills by conveying ideas clearly and effectively to the group.
- **Time Management:** Participants with roles responsible for keeping track of time or deadlines will enhance their time management skills to ensure the group stays on schedule.

Example activity:

Topic: analysing the environmental impact of a harvesting operation given a certain work site.

Break participants into groups of up to seven to complete a task. Directly assign—or ask each group to choose—one or more of the following roles to each member: the leader (in charge of making sure everyone is on task), the speaker (the presenter who reports out), the recorder (writes the group's ideas and responses), the reflector (manages the group's process), the analyst (responsible for researching and analysing data related to ecosystem diversity), the timekeeper (responsible for managing time during group discussions and keeping the group on track), the presenter (responsible for summarizing the group's findings and presenting them to the class).

Each group collaborates to explore the topic, with each member fulfilling their assigned role and contributing to the group's understanding. After the activity, each group presents their findings to the class, and the presenter summarises the group's key insights.

Category/ies of digital technologies implemented

Teleconferencing
Video editing
Chat and live box
Online content sharing
Learning Management System

Example of digital tools that can be applied

Zoom, Slack, Teams, Google Meet, Google Drive, Dropbox,
Moodle, Camtasia, Pinnacle, etc..

One-minute reflection

Description

One-minute reflection is a brief learning activity where students take a moment to reflect individually on a specific topic, concept, or experience. It can be done in various formats, such as written reflections, verbal discussions, or online surveys.

Give the participants one minute to jot down a response to a question such as “What was the most important thing you learned during this class?”, “What is still unclear?”, or “Summarise the unit we just completed in one sentence.”

Invite (but don't require) your participants to leave their responses with you as they leave the class. The objective is to get participants to distil a presentation or unit of learning into a single statement or question, helping them deepen their learning.

The one-minute reflections, if participants share them with the trainer, can give that trainer a “snapshot” of what they are thinking, what they have learned, and what aspects of the topic are still unclear. One-minute reflections tend to be conducted at the end of a class, but they are also effective at other times, such as when a unit of material has been completed and another one is about to be undertaken. During online or blended learning such activity can be done through the use of the chat space of the teleconferencing tool in use, or through the use of virtual whiteboarding tools and chat and live box tools, where the trainees can report their sentences. In many e-learning platforms, there are plugins and tools that allow students to comment or participate in a forum on a single topic.

Learning outcomes

- Achieve greater self-awareness through one-minute reflections, identifying their strengths and challenges in understanding the concepts of interest.
- Relate concepts taught during classroom time or during specific field activities to other real-world contexts, deepening their understanding of the subject matter's practical applications.

Competencies

- Develop empathy and perspective-taking skills while reflecting on the implications of forestry practices on various stakeholders and ecosystems.
- Analyse, evaluate and synthesise information to develop their reflections.
- Identify areas for improvement, fostering a commitment to continuous learning and professional development in forestry topics of interest.

Trainers can help participants develop essential competencies related to self-awareness and critical thinking. The activity fosters a deeper connection to the subject matter, enhancing learning outcomes and promoting a sense of purpose and responsibility as professionals.

- **Critical Reflection:** One-minute reflection encourages participants to engage in critical thinking and self-assessment as they reflect on their learning experiences, knowledge, and understanding of the tackled concepts.
- **Environmental Consciousness:** One-minute reflection in forestry education often focuses on environmental and climate-related topics, fostering environmental consciousness and awareness among participants.
- **Communication Skills:** Whether written or verbal, the one-minute reflection activity helps participants practise articulating their thoughts and ideas effectively.
- **Metacognitive Awareness:** Through the reflection process, participants develop metacognitive skills, becoming more aware of their learning strengths, areas for improvement, and strategies for future learning.
- **Personal Growth:** Engaging in reflective exercises allows participants to recognise their personal growth, acknowledging progress and accomplishments in their forestry education journey.

Use case in the forestry education sector

Example activity:

This activity can be applied to any topic of interest during forest education.

It is important to give participants a spark for reflection and give them a moment to reflect. During this time, participants can jot down their thoughts, ideas, or questions related to the specific topic. Bring the class back together for a class-wide reflection.

Invite volunteers to share their most thought-provoking insights or questions from the one-minute reflections and sharing sessions. Use the shared insights and questions as a foundation for a guided final discussion. Conclude the activity by summarising the key takeaways from the one-minute reflections and the guided discussion.

Reinforce the importance of continuous learning and critical reflection in forest operations-related issues.

Category/ies of digital technologies implemented

Teleconferencing

Example of digital tools that can be applied

Google Meet, Zoom, Jitsi, Teams, Slack, Discord, etc.

Online discussions

Description

Foster collaboration and critical thinking by organising online discussion forums or using collaboration tools. Breakout rooms can be set up during videoconferencing sessions to allow group discussions on the topic of interest. The discussion can be set up also during asynchronous learning: if the lecture consists of a recorded video or of a series of shared materials on an e-learning platform, one can still ignite collaboration and opinion sharing through the use of chat and live box instruments or specific plugins of the e-learning platform, so that the trainees can have a virtual moment of classroom feeling.

Learning outcomes

- Demonstrate a deeper conceptual understanding of various concepts and their practical applications.
- Exhibit analytical thinking skills entailed in the analyses of the topics of interest, identifying strengths and weaknesses in arguments, and proposing evidence-based solutions.
- Develop the ability to identify the interdisciplinarity of the topic of interest for the discussion.
- Gain new insights and knowledge through the perspectives shared by the other participants during the discussions.
- Critically evaluate the credibility and reliability of information shared in online discussions, enhancing the research and information literacy skills.
- Gain the ability to apply theoretical concepts to real-world scenarios, demonstrating a practical understanding of forestry principles.
- Cultivate a positive online communication culture, promoting constructive and inclusive discourse.

Competencies

Trainers can help participants develop essential competencies related to self-awareness and critical thinking. The activity fosters a deeper connection to the subject matter, enhancing learning outcomes and promoting a sense of purpose and responsibility as professionals.

- **Critical Reflection:** One-minute reflection encourages participants to engage in critical thinking and self-assessment as they reflect on their learning experiences, knowledge, and understanding of the tackled concepts.
- **Environmental Consciousness:** One-minute reflection in forestry education often focuses on environmental and climate-related topics, fostering environmental consciousness and awareness among participants.
- **Communication Skills:** Whether written or verbal, the one-minute reflection activity helps participants practise articulating their thoughts and ideas effectively.
- **Metacognitive Awareness:** Through the reflection process, participants develop metacognitive skills, becoming more aware of their learning strengths, areas for improvement, and strategies for future learning.
- **Personal Growth:** Engaging in reflective exercises allows participants to recognise their personal growth, acknowledging progress and accomplishments in their forestry education journey.

Use case in the forestry education sector

Example activity:

Topic: Comparison of organisation issues entailed in different harvesting techniques.

The participants can work individually or in groups. Each group/participant is assigned a different harvesting technique to analyse (i.e., cable crane; winch-assisted logging; etc.).

The groups/participants are provided with an online discussion platform or forum where they can interact and share their ideas. The results of group discussions or individual research can be summarised in an online post in the platform, where the other participants/groups can interact asking clarifying questions, providing constructive feedback, offering additional insights or perspectives. The activity can be concluded in a whole discussion comparing the different actions entailed in the different techniques, analysing the several approaches and behaviours that the forest operator has to adopt each time.

**Category/ies
of digital
technologies
implemented**

Teleconferencing
Chat and live box

**Example of
digital tools
that can be
applied**

Slack, Discord, Teams, Moodle, etc.

Peer Grading

Description

Peer grading is a learning activity for forestry education that involves participants assessing and evaluating the work of their peers. It can be a valuable tool for promoting active learning, encouraging critical thinking, and providing students with a deeper understanding of forestry concepts. As a rule, extended group work that asks students to reach a common goal will increase accountability and cooperation if participants grade each group member's contribution—on both the process and on the product of the work. However, it is fundamental that, before the assignment, the trainer creates a clear and comprehensive grading rubric. The rubric should outline the criteria for assessment, including specific aspects related to forestry knowledge, technical skills, critical thinking, and communication.

Learning outcomes

- Be able to evaluate the effectiveness of peers' work by assessing its coherence, relevance, and ability to address the assignment's objectives.
- Apply the grading criteria provided by the trainer to assess peers' work, ensuring consistency and alignment with the assignment's requirements.
- Be able to reflect on one's own work in comparison to the peers', leading to insights on how to refine one's approaches and enhance learning outcomes.
- Develop the skill of providing constructive feedback that is specific, actionable, and focused on helping peers enhance their learning and performance.
- Be able to identify the strengths and weaknesses of peers' assignments, learn from good examples and recognise areas for improvement in one's own work.

Competencies

Through Peer Grading learning activity, participants develop competencies in critical evaluation, analytical skills, communication, fairness, and self-assessment, while achieving learning outcomes related to evaluating

Use case in the forestry education sector

effectiveness, providing constructive feedback, applying grading criteria, identifying strengths and weaknesses, and reflecting on their own work.

- **Analytical Skills:** Participants will enhance their analytical skills as they assess various aspects of their peers' assignments, such as content, structure, and supporting evidence.
- **Critical Evaluation:** Participants will develop the ability to critically evaluate the quality and effectiveness of their peers' work, providing constructive feedback to help them improve.
- **Self-Assessment:** Engaging in peer grading will encourage participants to reflect on their own work and approach it from a critical perspective, identifying areas where they can improve in future assignments or real-world scenarios.
- **Communication and Feedback:** Participants will improve their communication skills by providing clear and specific feedback to their peers, highlighting strengths and areas for improvement in a respectful manner.
- **Fairness and Impartiality:** Participants will exercise fairness and impartiality in evaluating their peers' work, avoiding bias, and applying consistent grading criteria.

Example activity:

The trainer assigns a writing task to the participants, such as defining an operational plan, or a risk assessment given a specific work site example.

Participants submit their completed assignments to the trainer, who organises them into pairs or small groups and provides clear grading criteria or rubrics to guide the peer grading process.

Participants exchange assignments with their peers and evaluate them based on the provided grading criteria.

Each participant provides feedback to their peer, highlighting the strengths of the work and offering constructive suggestions for improvement. After the peer grading process, participants receive their graded assignments and feedback from their peers, which they can use to reflect on their own work and make improvements.

Category/ies of digital technologies implemented

Teleconferencing
Chat and live box
Online content sharing
Learning Management System

Example of digital tools that can be applied

Zoom, Slack, Teams, Google Meet, Google Drive, Dropbox, Moodle, etc.

Poll-Group-Repoll

Description

The 'Group-Poll-Regroup' learning activity in forestry education is an interactive and dynamic exercise that encourages participant engagement and promotes critical thinking. This activity involves multiple stages, where participants work collaboratively in groups to discuss and share their perspectives on a forestry-related topic. The process includes polling individual opinions, regrouping to discuss diverse viewpoints, and eventually arriving at a collective understanding or solution. Launch a poll and ask participants a question with divergent responses. Have participants discuss their positions in a small group. Relaunch the same poll to see if their responses have changed. Anchor a class discussion around any changes to participants' answers.

Learning outcomes

- Participants gain an understanding of various polling methods, their applications, and the importance of accurate data collection.
- Participants develop skills in interpreting and analysing poll data and translating it into actionable information.
- Participants improve their ability to communicate effectively through digital platforms, presenting poll results and engaging in online discussions.
- Participants can make informed decisions based on data and collaborative input.
- Participants learn to appreciate and understand diverse viewpoints through group interactions and discussions.
- Participants reflect on their initial poll responses, consider alternative viewpoints, and potentially revise their opinions based on new information or group discussions.

Competencies

- **Critical Thinking:** Engaging in poll analysis, group discussions, and re-polling helps participants enhance their critical thinking skills by evaluating data and forming evidence-based conclusions.

- **Collaboration:** Working in groups allows participants to collaborate effectively, exchange ideas, and respect diverse perspectives during discussions and decision-making.
- **Digital Literacy:** Participants develop their proficiency in using digital tools and platforms for polling and data analysis.
- **Data Interpretation:** Participants develop the ability to interpret and analyse poll results, drawing meaningful insights from the data presented.
- **Communication Skills:** Engaging in group discussions and presenting poll findings helps improve verbal and written communication skills.
- **Problem-Solving:** Participants practice problem-solving skills by identifying challenges, proposing solutions, and evaluating the effectiveness of different approaches during the re-polling process.
- **Open-mind attitude:** Participants acquire the ability to listen to others' opinions and points of view with an open and welcoming asset, considering the possibility of reviewing their positions according to the new information gathered through the discussion with peers.

Use case in the forestry education sector

Example activity:

Define the Forestry Topic: Choose a specific forestry topic or issue that requires critical analysis and discussion. It could be a complex problem, a management scenario, or a case study related to forestry practices (i.e., given a specific work site characteristic, choose a logging technique and support such a decision).

Forming Groups: Divide the participants into small groups, ideally consisting of 4-6 members each. If possible, ensure a mix of backgrounds, levels of experience, and perspectives within each group to encourage diverse discussions.

Initial Polling: Ask each participant in their respective groups to individually express their opinions, thoughts, or solutions related to the forestry topic

They can do this by writing down their ideas or using online polling tools.

Regrouping and Discussion: After the initial polling, reshuffle the groups so that each new group includes at least one representative from each of the initial groups. This regrouping ensures the integration of various perspectives.

Sharing and Exploring Diverse Perspectives: Within the newly formed groups, participants share their initial opinions and discuss their reasoning with their new peers. This exchange of ideas encourages participants to consider alternative viewpoints and challenge their own assumptions.

Identifying Points of Agreement and Disagreement: As the discussions progress, participants identify points of agreement and disagreement within the group. They may find common ground on certain aspects while discovering differing viewpoints on others.

Synthesizing and Collaborative Learning: Encourage the groups to work together to synthesize the various perspectives and arrive at a collective understanding or solution. This collaborative learning process enables participants to critically analyse the forestry topic from multiple angles.

Group Presentations: Each group presents their collective findings, highlighting the diverse perspectives explored, areas of agreement, and any unresolved disagreements. This presentation phase encourages effective communication and articulation of ideas.

Whole Class Discussion: After all the groups have presented, facilitate a class-wide discussion. Compare the different group conclusions, discuss the merits of each perspective, and explore potential ways to address conflicting viewpoints.

Final Reflection: Conclude the activity with a reflection session, where participants have an opportunity to express what they've learned from the activity, how their perspectives may have evolved, and any insights gained from considering multiple viewpoints.

Category/ies of digital technologies implemented

Teleconferencing
Audience engagement platform
Chat and live box

Example of digital tools that can be applied

Zoom, Slack, Teams, Google Meet, Mentimeter, Kahoot, etc.

Pro-Con Grid

Description

The 'Pro-Con Grid' learning activity is a structured and analytical exercise that helps participants in forestry education explore the advantages and disadvantages of a specific forestry-related topic or practice. This activity encourages critical thinking, problem-solving, developing analytical and evaluative skills and balanced evaluation of different aspects of a given issue. Pro-Con-Grid requires participants to go beyond their initial position and reactions and come up with points of discussion for the other side of the issue. Finally, it also requires participants to weigh the points of competing positions and claims. The Pro-Con Grid is typically presented in a table format that can consist of an online shared document or a blank canvas of a virtual whiteboarding platform, distinguishing columns for listing the pros (advantages) and cons (disadvantages) of the topic under consideration.

Learning outcomes

- Be able to identify and list the pros and cons of a given topic or issue, demonstrating an understanding of its multifaceted nature.
- Assess the strengths and weaknesses of the pro and con arguments collected, determining which points are most compelling.
- Be able to construct well-balanced arguments for both the pro and con sides of the topic, demonstrating an ability to see multiple perspectives.
- Be able to communicate, present and defend their own opinions on the topic, drawing upon the evidence and reasoning gathered during the activity.
- Interiorise the Pro and Con approach and apply it spontaneously to future issues and challenges.

Competencies

Through Pro-Con Grid learning activity, participants develop competencies in critical thinking, research, analysis, and communication, while achieving learning outcomes related to identifying pros and cons, evaluating arguments, constructing balanced viewpoints, and

presenting and defending their opinions on the topic. The activity encourages collaboration and open dialogue, promoting a deeper understanding of complex issues.

- **Research and Information Evaluation:** Participants will practice researching and gathering information to support the pros and cons they identify, learning to assess the credibility and relevance of their sources.
- **Analysis and Synthesis:** Participants will analyse the collected information and synthesize it into coherent arguments for the pro and con aspects of the topic, presenting well-reasoned points.
- **Critical Thinking:** Participants will develop critical thinking skills by analysing and evaluating the various advantages and disadvantages of the topic, considering different perspectives and implications.
- **Communication:** Participants will improve their communication skills by expressing their ideas clearly and concisely when presenting the pro-con arguments to their peers.
- **Integrity and fairness attitude:** Participants will embrace the approach of evaluating critically all the complex issues that they will encounter during future practices, to make conscious and fair decisions.

Use case in the forestry education sector

Example activity:

The topic of interest can be one that entails a certain thinking process to evaluate its best implementation (i.e., which tool or machinery to use to cut a tree in specific conditions).

Participants are divided into pairs or small groups, and each group is given a topic of interest. Each group creates a Pro-Con Grid on an online shared whiteboard or paper, with two columns labelled "Pros" and "Cons." Participants research and discuss the topic, listing the advantages (pros) and disadvantages (cons) of the use of a certain tool or machinery during harvesting/logging operations in a certain situation in the respective columns of the grid.

Roleplay

Description

Role play is a powerful experiential learning activity where students take on different roles and act out scenarios related to forestry education. It allows students to immerse themselves in real-world situations, fostering the development of various competencies. It consists in providing participants with characters to play in a pair or a group to highlight the challenge or tension of a specific interaction. For example, assign a student to play the part of a coordinator giving difficult feedback to a defensive subordinate regarding poor performance, or the part of a work site coordinator while instructing colleagues before the launching of the forest operations during cable crane logging.

Learning outcomes

- Apply acquired knowledge to practical situations, bridging the gap between theory and real-world applications.
- Learn to transform conflicts and find compromises in forestry-related situations, building skills for effective communication and negotiation.
- Ability to explore the interests and concerns of different stakeholders, fostering strategies for engaging and collaborating with diverse actors and roles in forest sites and forest operations-related situations.
- Develop problem-solving and adaptability skills to different circumstances implied during forest operations implementation.
- Identify areas of improvement in one's behaviour, communication/public speaking skills and relationship with other people.
- Apply critical thinking and active listening in order to be able to address different dialogical situations.

Competencies

- **Problem-Solving:** Participants are able to tackle complex challenges by analysing situations, generating solutions, and making decisions as they act out different roles.
- **Critical Thinking:** Engaging in role play requires participants to think critically about the implications of their actions, considering the potential consequences for forest management and conservation.
- **Decision-Making:** Role play helps participants to practice how to make decisions in dynamic and uncertain environments, mirroring the real-world challenges faced by forestry professionals.
- **Communication and Collaboration:** Participants enhance their communication skills by effectively portraying their roles, engaging in discussions, and negotiating with others during the role play. Collaboration is fostered as they work together to achieve common goals within the scenarios.
- **Empathy and Perspective-Taking:** As participants embody different roles, they develop empathy and perspective-taking skills, gaining insights into the diverse viewpoints of stakeholders involved in forestry operations.

Use case in the forestry education sector

Activity example:

Topic: Set the stage for forest operations (clear-cutting and logging through cable crane) implementation in a windthrown site.

Assign different roles to students (i.e. work site responsible; tree cutting operator; responsible for the setting of the cable crane system, etc.). Provide a background description of each character and assign it to each participant (if the participants exceed the number of roles of interest, it is possible to engage only a part as a role player and the rest as observers).

Prepare a topic of discussion or launch the role-play according to a specific moment entailed in the forest operation of interest. The trainer should guide the role play in a way that the most important issues emerge and are faced. After the role-play, conduct a discussion and debriefing session with the participants, from which it will be possible to extrapolate the key messages of the topic of interest.

An example of this activity was used in the LEAF (Lowering Emissions in Asia's Forests) project to develop a low-emission land use plan for Don Lig Province, Cardia. The role play allows students and participants to explore real-world issues and trade-offs in balancing economic development, social inclusion and environmental sustainability within a low-emission context.

http://curriculum-downloads.recoftc.org/LELUP/LELUP_RolePlay_2015_08_03_Introduction.pdf

**Category/ies
of digital
technologies
implemented**

Teleconferencing
Chat and live box
Online content sharing

**Example of
digital tools
that can be
applied**

Zoom, Google Meet, Teams, Slack, Discord, etc.

Snowballing

Description

Snowballing is a learning activity where participants build upon each other's ideas in a structured manner, creating a chain of contributions on a specific topic. Participants discuss something or investigate an issue in pairs. The pairs then join another pair to form a group and share their findings. The small groups then join together to make a larger group: 2 →4 →8 →16 → whole-class. The grouping can be done, in online live sessions, through the instruments that allow for the creation of break out rooms or separated virtual space where the group members can gather and participate in the activity.

Learning outcomes

- Achieve an in-depth understanding of the selected topics by exploring various aspects and insights shared by their peers.
- Critically assess and refine the ideas presented, contributing to a well-rounded discussion.
- Apply knowledge by contributing relevant insights, strategies, or solutions to the snowballing chain, showcasing their understanding of real-world scenarios.
- Develop empathy and perspective-taking skills, appreciating diverse viewpoints and understanding the complexities of forestry challenges.
- Engage in reflective learning, analysing the chain of contributions, and considering the insights gained during the collaborative process.

Competencies

Through the snowballing activity, students actively participate in a dynamic and inclusive learning experience, contributing to a comprehensive exploration of complex topics. This cooperative learning approach enhances critical thinking, communication skills, and interdisciplinary understanding, empowering participants to become informed and responsible professionals.

Use case in the forestry education sector

- **Critical Thinking:** The snowballing activity fosters critical thinking as participants analyse and evaluate the ideas put forward by their classmates, identifying strengths, weaknesses, and potential areas for further exploration.
- **Communication Skills:** participants enhance their communication skills, expressing their thoughts effectively and engaging in respectful discussions.
- **Collaboration and Teamwork:** The snowballing activity promotes collaboration and teamwork as participants work together to construct a comprehensive chain of contributions related to the chosen forestry topic.
- **Information Synthesis:** participants practice information synthesis, creating a cohesive and interconnected flow of information.

Example activity:

Explore Sustainable Practices in Forest Operations through Collaborative Snowballing.

Divide the class into small groups of 4-5 participants through break-out rooms or other tools for online discussion. Introduce the topic of "Sustainable Forest Operations" and provide an overview of key concepts and challenges. Instruct each group to begin the snowballing activity by having one member mention one aspect to be aware of for guaranteeing sustainable forest operations on a shared digital platform or chart.

Once the initial contributions are made, each group member should review the ideas already shared by their peers and choose one aspect that resonates with them the most. The next step is to build upon the chosen idea by proposing additional details, examples, or potential forestry techniques in order to take care of that specific environmental aspect.

Emphasise the importance of constructive feedback and respectful discussion during this process.

In the next round, each group member will review the updated ideas from their group and select another strategy to expand upon. Participants will continue this process, taking turns to contribute, build upon, and refine ideas within their group.

Once the snowballing activity is complete, each group will present their comprehensive list of sustainable forest operations strategies to the entire class. During the presentations, participants will explain the rationale behind the strategies they chose and discuss the synergies between different approaches. After each group presentation, facilitate a class-wide discussion where participants can compare the strategies proposed by different groups.

Encourage students to identify common themes and potential areas of overlap between the strategies. Conclude the activity with a reflection session, where participants individually or in groups discuss the insights gained from the snowballing process.

Facilitate a synthesis of the key sustainable forest operations strategies that emerged from the activity, highlighting their potential impact on environmental, economic, and social aspects of forestry.

Category/ies of digital technologies implemented

Teleconferencing
Chat and live box
Online content sharing

Example of digital tools that can be applied

Google Meet, Zoom, Jitsi, Teams, Slack, Discord, etc.

Specialisation Project

Description

A specialisation project is an in-depth and hands-on learning activity designed to help participants in developing expertise in a specific area of interest. This project provides participants with the opportunity to apply theoretical knowledge, conduct research, and gain practical experience relevant to their chosen specialisation. This activity allows participants to delve deeply into a subject they are passionate about, fostering expertise and preparing them for future professional endeavours in their chosen field of specialisation.

Learning outcomes

- Gain an in-depth understanding of the specialised area by conducting extensive research and engaging in practical applications.
- Be able to identify and analyse complex problems or challenges related to the specialisation topic, proposing well-reasoned solutions.
- Apply the specialised knowledge and skills to real-world situations, demonstrating the practical relevance of the acquired expertise.
- Develop the ability to manage and execute a substantial professional endeavour.
- Be able to effectively present project findings, showcasing the ability to communicate complex concepts clearly and persuasively.
- Recognise how more enthusiastic participation, more interest and openness lead to enhanced results.

Competencies

Through the "Specialisation Project" learning activity, participants develop competencies in research and information literacy, critical thinking, specialised knowledge, project management, and communication.

- **Research and Information Literacy:** Participants will develop competencies in conducting thorough research, evaluating sources, and synthesising information from various credible resources.

Use case in the forestry education sector

- **Critical Thinking and Problem-Solving:** Participants will apply critical thinking skills to analyse complex issues, identify problems, and propose innovative solutions within their specialised area.
- **Specialized Knowledge:** Through the project, participants will deepen their knowledge and expertise in a specific subject or field, becoming more proficient in their chosen specialisation.
- **Project Management:** Participants will learn project management skills, including planning, organising, and executing the project effectively within given timelines and resources.
- **Communication and Presentation:** Participants will improve their communication skills by effectively conveying their research findings and project outcomes to various audiences.
- **Self-Improvement Attitude:** Participants will enhance their curiosity and creativity and will develop interest in deepening specific topics.

Example activity:

The activity can start with dividing participants into groups of up to seven. Have them develop online whiteboards presenting support for an idea, a deep dive into specific topics, or analyse a proposed solution to a problem (a portion of the in-person teaching time can be dedicated to this before groups continue asynchronously). Make sure those boards are visible to all. Ask groups to report back and “teach” the class during the in-person or synchronous online session. Then, hold a discussion of larger problems (that require understanding the sub-topics) as a large group. Ask group members to assess the quality of their peers’ contributions to increase accountability.

Category/ies of digital technologies implemented

Teleconferencing
Audience engagement platform
Chat and live box
Learning Management System

Example of digital tools that can be applied

Zoom, Slack, Teams, Google Meet, Google Drive, Dropbox,
Moodle, Camtasia, Pinnacle, etc.

Sticky-note clustering

Description

Sticky-note clustering is a collaborative learning activity where participants use sticky notes to generate ideas or concepts related to a specific topic, group them into clusters based on their similarities, and discuss their findings. This activity helps clarify and depict topics of interest in a collaborative way.

The trainer provides the participants with a question or problem, and then during live sessions, gives each of them three or four sticky notes. On each of their sticky notes, participants write down one idea. Participants stick their notes onto a wall or whiteboard and then collaborate on moving them around in order to sort the ideas into categories. The digital version of this activity can be led on virtual whiteboarding tools so that the trainees can write and report their opinions or ideas on virtual sticky notes on shared blank boards online. This activity combines brainstorming (jotting down the ideas) with critical thinking (organising the ideas into categories) and helps discuss and collaborate on shared opinions. A screenshot of the composed board, in fact, can be referred to later and be the spark for a lecture or an online discussion.

Learning outcomes

- Achieve a deeper conceptual understanding of the topics of interest through the visual representation and discussion of related ideas.
- Develop the ability to identify patterns, trends, and common themes emerging from the clustered sticky notes, allowing to gain insights into broader issues or deepen any singular topic, depicting the different passages needed to perform it in the correct way.
- Refine the ability to communicate complex concepts with clarity and coherence to peers.
- Recognise the interdisciplinary nature of the topic of interest, considering the different points and phases that emerged during clustering and analysing sticky notes.
- Develop adaptability and flexibility in grouping sticky notes, considering alternative clustering and adjusting approaches based on emerging patterns.

Competencies

- **Collaboration and Teamwork:** The sticky-note clustering activity fosters collaboration and teamwork as participants work together to generate ideas, categorise them into clusters, and discuss their findings.
- **Critical Thinking:** Participants will engage in critical thinking as they analyse and compare different ideas presented on the sticky notes, identifying patterns, and forming connections between them.
- **Communication Skills:** Participants will improve their communication skills by articulating their ideas on the sticky notes concisely and effectively, as well as through group discussions during clustering.
- **Problem-Solving:** The activity encourages participants to identify solutions to forest operation challenges and to elaborate the skills needed during the practice implementation by examining the clustered sticky notes and summarising the several components of forest operations.

Use case in the forestry education sector

Example activity:

The classroom can be divided into small groups that will work on a common blank canvas of virtual whiteboarding platforms, otherwise, the first part can be done individually by all the students on the same blank canvas. The first phase entails brainstorming and writing down different details, information and practices that must be considered when approaching the cut of a tree not in normal conditions of tension and health. Once the brainstorming time is finished, the sticky notes can be reported on a wider common blank virtual whiteboard shared with all the participants, if the first part was done by groups and not individually. The groups/participants will start clustering the sticky notes based on similarities, grouping related ideas together. For example: Timber Harvesting Techniques: Selective logging, clear-cutting, sustainable logging;

Tree characteristics: species, subspecies, deciduous/evergreen, etc.; Tree and site conditions: aspect, season, weather, aspect, type of wood; Risks and challenges for the operator; Best practices to face the operation. Participants will discuss and collaborate while clustering the sticky notes, sharing their insights and perspectives on different forest operations concepts. Once the sticky-note clustering is completed, each group/participant can analyse the clusters. Discuss the patterns and trends that emerge from the grouped ideas. The trainer will have to guide participants to identify potential connections and relationships between different clusters and put them in order according to the different phases of the operation performance. As a final step, participants could summarise the different phases and steps clustered with one sentence and report a checklist of important elements to consider when cutting a tree in non-normal conditions.

Category/ies of digital technologies implemented

Teleconferencing
Chat and live box
Virtual whiteboarding tools

Example of digital tools that can be applied

Padlet, Mural, Miro, etc.

Student Teams-Achievement Divisions (STAD)

Description

The Student Teams-Achievement Divisions STAD learning activity is a cooperative learning strategy designed to enhance professional achievement and collaboration among participants. It involves organising participants into heterogeneous teams to work together on learning tasks and promoting individual accountability within the group. This approach creates a supportive and interactive learning environment, fostering engagement and promoting positive learning outcomes for all participants.

Learning outcomes

- Develop teamwork and cooperation skills in achieving shared learning goals.
- Be able to master the material and contribute to the team's success.
- Develop improved communication skills, both in presenting own ideas and actively listening to the team members.
- Experience increased confidence and motivation in their professional performance.

Competencies

- Collaborative Skills: Participants will develop competencies in working collaboratively with their team members, valuing each other's contributions, and leveraging individual strengths.
- Communication: Participants will improve their communication skills by actively participating in group discussions, sharing ideas, and explaining concepts to their peers.
- Active Listening: Participants will practice active listening skills, paying attention to their team members' ideas and perspectives during group activities.
- Problem-Solving: Participants will engage in problem-solving tasks as a team, learning to analyse challenges, explore various solutions, and reach consensus.
- Leadership and Followership: Through rotating roles within the team, participants will have the opportunity to exercise leadership skills and understand the importance of effective followership.

Use case in the forestry education sector

Example activity:

This teaching practice is particularly useful for challenging technical courses. Break participants into groups of up to seven. Assign work for participants to learn together (i.e., maintenance of specific working tools). All group members are accountable for one another's learning. After a decided period of time, quiz each person individually and calculate the average group score (this can also count as a portion of the final grade). The group with the highest average score receives a reward. These groups can work together for a portion of the time during an online or in-person class with the educator answering questions. This structure works outside of class time as well with an asynchronous discussion board to answer participants' questions.

Category/ies of digital technologies implemented

Teleconferencing
Video editing
Chat and live box
Online content sharing
Virtual whiteboarding tools

Example of digital tools that can be applied

Zoom, Slack, Teams, Google Meet, Google Drive, Dropbox, Moodle, Camtasia, Pinnacle, etc.

Think-Pair-Share

Description

Think-pair-share (TPS) is a collaborative learning strategy where participants work together to solve a problem or answer a question or discuss an assigned topic of interest. This strategy requires participants to (1) think individually about a topic or answer to a question; and (2) share ideas with other participants. Discussing with a partner maximises participation, focuses attention, and engages participants in comprehending the topics of interest.

Learning outcomes

- **Analyse:** Participants will be able to analyse different viewpoints to an issue or topic during the "Pair" phase of the activity, considering various perspectives.
- **Communicate:** Participants will be able to communicate their ideas effectively to a partner during the "Pair" phase, articulating their thoughts clearly and actively listening to their partner's input.
- **Discuss:** Participants will be able to engage in group discussions during the "Share" phase, contributing with their ideas, listening to others, and building upon the collective knowledge of the group.
- **Synthesise:** Participants will be able to synthesise the information and insights gained from their partner and the group during the "Share" phase to develop a more comprehensive understanding of the topic.

Competencies

- By engaging in this "Think-Pair-Share" activity, participants will develop competencies in critical thinking, communication, active listening, and collaboration, while achieving learning outcomes such as explaining, analysing, communicating, discussing, and synthesising information related to the topic of interest.
- **Critical Thinking:** Participants will develop their critical thinking skills by analysing and evaluating different perspectives during the "Think" phase of the activity.
- **Communication:** Participants will improve their communication skills by expressing their thoughts and ideas clearly and concisely during the "Pair" and "Share" phases of the activity.

Use case in the forestry education sector

- **Active Listening:** Participants will enhance their active listening skills during the "Pair" and "Share" phases, as they listen to their peers' ideas and provide constructive feedback.
- **Collaboration:** Participants will develop their ability to work collaboratively with peers, share responsibilities, and build upon each other's ideas during the "Pair" and "Share" phases of the activity.

Example Activity:

Topic: Forest Operations and their Impact on Biodiversity

Think: Participants take a few minutes to individually think about the topic, recalling relevant information, and formulating their opinions about how forest operations can impact biodiversity.

Pair: Participants pair up and share their thoughts and ideas with their partners, discussing various aspects of forest operations' effects on biodiversity, and exploring potential solutions (approaches and behaviours) to mitigate the impact.

Share: The trainer then facilitates a class discussion, where participants share some of the key points discussed during the "Pair" phase. They contribute to the collective understanding of the topic and explore diverse perspectives and solutions.

Category/ies of digital technologies implemented

Teleconferencing
Chat and live box
Online content sharing

Example of digital tools that can be applied

Zoom (i.e. break out rooms), Google Meet, Teams, Slack, etc.

Value-Line

Description

The 'Value Line' learning activity is an interactive and engaging exercise that helps participants explore and prioritise various values and objectives related to the topic of interest. This activity encourages critical thinking, decision-making, and communication skills as participants work together to assess the trade-offs and conflicts that may arise from complex issues.

Ask each participant to rank how they feel about an idea, a topic, or a practice, then break them out in groups of up to four participants from a mix of ranks to discuss the issue. This will work best online (and in person if participants are permitted to move about in a limited capacity).

Learning outcomes

- Analyse and evaluate different values and objectives, while assessing the strengths and weaknesses, trade-offs, and conflicts of various perspectives on the topic of interest.
- Express and articulate individual opinions effectively.
- Engage in group discussions, presenting ideas clearly and logically.
- Listen actively and respond constructively to peer presentations and feedback.
- Work collaboratively with peers from diverse backgrounds.
- Share insights and collaborate to arrive at a collective understanding or solution.
- Respectfully consider and integrate different viewpoints within the group.
- Appreciate the importance of considering multiple perspectives in decision-making.
- Evaluate how discussions with peers influenced one's own understanding.

Competencies

By engaging in such activity participants gain a deeper understanding of the complexities and trade-offs involved in forestry decision-making and learn to approach forest management with a holistic perspective, considering ecological, social, economic, and ethical factors.

Use case in the forestry education sector

- **Critical Thinking:** Participants may develop critical thinking skills to evaluate information, analyse data, and make informed decisions related to the "Value Line" activity.
- **Data Analysis:** Participants could gain the ability to interpret and analyse data represented in the "Value Line," enabling them to draw insights and conclusions.
- **Communication:** The activity may help improve participants' communication skills, as they discuss and share their insights with others.
- **Decision-Making:** Participants may enhance their decision-making abilities by using the "Value Line" to assess different options or scenarios.

Example activity:

Define the topic of interest and the case study and start by outlining a range of forest management practices and values that are relevant to the course or module. These may include risk assessment actions, biodiversity and sustainability-related actions, organisational matters, practical actions for the correct use and implementation of instruments and machines, etc.

Create a Value Line: Draw a horizontal line on an online shared blank whiteboard, blackboard, or large poster paper, representing a continuum from one end to the other. Label one end as "Least Important" and the other end as "Most Important" otherwise use the polling function of a teleconferencing or audience engagement platform.

Assign Values and Objectives: Assign each value or objective related to forest management to a specific point on the value line based on its perceived importance. For example, timber production might be placed towards the "Most Important" end if it is a primary objective of the forest management practice under observation.

Group Discussion: Divide the participants into small groups and provide them with the value line chart. Instruct each group to discuss and collaborate on the placement of the different values and objectives along the line based on their own perspectives and priorities.

Presentations and Justifications: Each group presents their value line to the rest of the class. As they explain their placements, they should provide justifications for their choices, considering ecological, economic, social, and ethical factors that influence their forest management decisions.

Comparisons and Trade-offs: Facilitate a class-wide discussion after all the groups have presented their value lines. Compare the variations in placements and discuss the trade-offs and conflicts that arise when prioritising different forest management goals. Encourage participants to consider the challenges of balancing conflicting values and objectives.

Revisiting and Adjusting the Value Line: Based on the class discussion, allow each group to revisit their value line and make any adjustments they see fit. This iterative process enables participants to reconsider their initial placements considering new insights gained from the discussion.

Reflection and Synthesis: Conclude the activity with a reflective session where participants share their thoughts on the exercise. Discuss the complexity of forest management decision-making and the need for interdisciplinary approaches that consider various stakeholders and perspectives.

Category/ies of digital technologies implemented

Teleconferencing
Audience engagement platform
Chat and live box

Example of digital tools that can be applied

Zoom, Slack, Teams, Google Meet, Mentimeter, Kahoot, etc.

Virtual Field Trips

Description

In order to overcome the downsides of distance learning, one can use digital technologies to visit the sites of interest, get acquainted with the area and therefore anticipate some parts of the real site preliminary survey, gathering helpful information for the organisation of the practical part. Take learners on virtual field trips to the sites of interest using platforms like Google Earth, maps, or 360-degree videos.

Learning outcomes

- **Critical Thinking and Problem-Solving:** Participants will engage in critical thinking exercises, considering complex challenges and proposing innovative solutions that align with sustainable and safe practices.

Competencies

Through this virtual field trip to specific areas, students will not only expand their knowledge and understanding of the locations but also develop essential digital and critical thinking skills necessary for navigating the complexities of issues in the modern world.

- **Digital Literacy:** Participants will develop proficiency in using digital tools and virtual platforms to access and navigate site-related information, data, and interactive resources.
- **Critical Thinking:** Participants will analyse and evaluate complex concepts lying behind the different environments and ecosystems and the possible impacts of human activities.
- **Scientific Inquiry:** Participants will learn to ask relevant questions, design investigations, and gather data related to different areas, using virtual tools and simulations, in order to conduct preliminary surveys at the sites of interest.

Use case in the forestry education sector

Example activity:

Through appropriate digital technologies, students will explore forest sites of interest which are the object of future harvesting activity and will gain insights on the sustainable forest operations and the practices and principles that promote responsible forestry. They will virtually visit a well-managed forest area and engage in interactive activities to understand how forest operations can be carried out in an environmentally, socially, and economically sustainable manner. Videos or 360-degree panoramas will display timber harvesting techniques too. Virtual simulations of forest planning using different applications will teach how to optimise logging paths and minimise environmental impact. The lessons learnt could be summarised during a phase of discussion among the participants or through quizzes.

Category/ies of digital technologies implemented

Technical Apps & Tools

Example of digital tools that can be applied

Google Earth, Google Maps, GIS, etc..



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E+ FOREE TOOLBOX Digital skills for forest education



Boosting Digital Skills and Competencies in Forest Education

The objective of FOREE is to develop a Train-the-Trainer course (ToT) and MOOC on blended learning models to transform European forestry education from purely classroom-based courses into a flexible hybrid education system through the complementary use of digital learning concepts, tools and platforms and their broad application in adult forestry training courses.

The motivation for FOREE derives from the need

- to overcome the reservations of forestry teaching staff towards digital teaching through knowledge exchange and innovative approaches for conceptualization and implementation of e-learning formats;
- to improve further the skills and acceptance of combining digital learning formats and content with on-site teaching.

Project Partners:

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