TRANSFORMING TEACHING FOR A GREENER PLANET

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WORK PACKAGE 2. CONSOLIDATION OF KNOWLEDGE

Deliverable 3. GreenTeach FRAMEWORK

(VET Competencies Framework for Green Economy Fostering)

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Introduction

Sustainability is a multifaceted concept that includes environmental stewardship, social responsibility, and economic viability. Achieving it requires a comprehensive approach to problem-solving, innovation, and management. Education is the cornerstone of this approach, as it shapes the mindset and capabilities of future leaders and professionals. These individuals should not only acquire knowledge about environmental protection and sustainable development but also actively engage in addressing these issues.

To support the extensive transformation outlined in the European Green Deal, educational institutions are urged to equip students with the knowledge and skills necessary to tackle complex sustainability challenges. By incorporating green skills into their curricula and encouraging interdisciplinary research, vocational education and training (VET) plays a crucial role in developing the expertise required for future professionals to lead in a sustainable economy, combat climate change, and promote sustainable practices across various industries.

This document is developed in the framework of the project “Transforming Teaching for a Greener Planet” /GreenTeach/ which is a cooperation partnership in the Vocational Education and Training (VET) field co-funded by the Erasmus+ Programme of the European Union. Implemented by a consortium of six entities, such as the Burgas Free University (Bulgaria), the Multidisciplinary Research and Development Centre EU-Track (Italy), the secondary high school “Arturo Bianchini” (Italy), the public high school of Science Istanbul Ataturk Fen Lisesi /IAFL/ (Turkey), "Ion Luca" Theoretical High School (Romania), and the Vocational High School of Mechanical Engineering and Electronics /PGMEE/ (Bulgaria) project aims to promote and facilitate green and sustainable education within vocational training institutions. This will be achieved by developing and enhancing VET educators' green skillsets and sustainability competencies in alignment with the European Sustainability Competence Framework, “GreenComp” (European Commission, 2022).

This document is based on the findings of comprehensive research conducted in Bulgaria, Italy, Romania, and Turkey. The multi-faced research methodology encompassed qualitative and quantitative mixed-method approaches to examine various aspects of integrating green and sustainable competencies in the vocational education and training (VET) sector. Considering the identified skill shortages and the specific needs of VET educators, this document offers recommendations for establishing a framework designed to enhance and improve their sustainability and green competencies and thus to support the effective implementation of the

GreenComp in their pedagogical practices and vocational training settings to foster green economy.

Needs for VET educators reskilling and upskilling in the GreenComp context – analysis results

This section presents a systematic synthesis of the findings from the GreenTeach comprehensive research initiative conducted across Bulgaria, Italy, Romania, and Turkey. Employing a multifaceted research design, the study integrated both qualitative and quantitative methodologies to investigate the incorporation of green and sustainability competencies within the vocational education and training (VET) sector.

The results reveal that sustainability-related competencies are not yet fully embedded within national VET systems, primarily due to enduring systemic challenges that hinder their effective adoption. A key barrier identified across all participating countries is the lag in modernizing VET curricula to adequately reflect principles of sustainability and the green economy. To ensure the successful integration of green competencies and sustainable practices, the adoption of a more structured, strategic, and comprehensive framework is imperative.

Field research conducted with VET educators indicates a high level of motivation and commitment among these professionals to foster sustainability through educational practice. Nevertheless, beyond institutional backing, there is a pressing need for dedicated, context-specific professional development focused on sustainability and green competencies. This includes the provision of tailored training programs and accessible, practical resources aligned with the unique needs of VET instructors.

Furthermore, the analysis of the target audience's professional profiles, training preferences, and specific learning needs provides a robust foundation for the design of effective reskilling and upskilling interventions. These interventions should align with the European GreenComp framework and support the systematic integration of sustainability competencies into vocational education practices.

Training Principles and Paradigms Informed by Target Audience Analysis

Analysis of the target group helps to select the most efficient training paradigms. The GreenTeach training is addressed to VET teachers from Bulgaria, Italy, Turkey and Romania. The participants are specialists in different subject domains that have their specifics, complexity, dimensions, principles etc. The trainees are adult learners, who already possess the knowledge, skills, and abilities to work in their current occupations – VET schools.

Bearing in mind the above, the implementation of the training should be based on the application of the modern principles of adult learning, i.e. Andragogy (Knowles, 1984). To best reach adult Learners, there are five key factors which should be carefully considered:

- The material presented should have immediate usefulness to the learners.
- The material presented should be relevant to adult learners' lives.
- The training environment should be welcoming so that all learners feel safe to participate.
- The training presentation should be engaging.
- The training should be presented in a respectful manner, where learners have an opportunity to share their experiences.

Regarding the GreenTeach e-learning implementation, the following principles should be considered:

- Participants in the training learn because they want to. They learn best when they have decided they need to learn for a particular reason.
- Participants need to see that the subject matter and the methods are relevant to their activities and what they want to learn.
- All participants should be encouraged to share their experiences and knowledge.
- Participants in the e-training learn more when they participate in the learning process – discussion forums, webinars, and round tables should be considered where the trainees can actively participate in expressing their opinions, sharing information and knowledge and putting under discussion "hot" topics.
- Learners learn better when information is presented in different ways and easily accessible for all considering those with special learning needs – usage of different content formats and a variety of teaching techniques to meet the learners' preferences regarding learning styles.
- Participants in the training need to know where they are heading. The course syllabus, the training schedule, a trainees' guide, and a presentation of the overall training with a clear explanation of the learning objectives need to be at the trainees' disposal.
- Participants need to "try on" and practice what they are learning. They retain more information when they use and practice their knowledge and skills in their own practice.
- Teaching and learning address the distinct learning needs, interests, aspirations, or cultural backgrounds of individual trainees, i.e. it should be personalized.
- Learning is proficiency-based, i.e. the students advance in their education when they demonstrate they have learned the knowledge and skills they are expected to learn.
- Learners have the flexibility to learn "anytime and anywhere".
- Learners are given opportunities to generate flexible learning paths, i.e. they have choices about their own learning and contribute to the design of learning experiences.
- Learners are supported and facilitated in case of technical problems or content-related issues.

In light of the aforementioned considerations, the implementation of a self-paced and self-directed online course with a modular structure, supplemented by consistent support from instructors and technical facilitators, emerges as the most appropriate and effective solution.

Needs for enhancing sustainability competencies of VET teachers (based on GreenComp)

The research conducted indicates that, despite ongoing efforts, sustainability competencies are not yet fully integrated into Vocational Education and Training (VET) systems due to ongoing challenges that impede effective implementation. A major issue identified across all participating countries is the need to modernize VET curricula, especially regarding sustainability and the green economy. To ensure the successful incorporation of green practices and sustainability competencies into VET programs, a more structured and comprehensive approach is necessary.

Additionally, field research among representatives of the target group reveals a strong demand for professional development opportunities focused on sustainability education and digital pedagogy. Online courses and blended learning methods were recognized as effective ways to develop new skills, as long as they were well-structured and accessible.

Sustainability is a multifaceted topic. From a narrow perspective, it suggests that our resources are limited and should be used wisely to satisfy the needs of the present without jeopardizing the needs of future generations. Planetary boundaries help to define these needs by establishing thresholds or limits, indicating where these boundaries have been exceeded. Doughnut Economics (DEAL, 2024) provides a visual framework for sustainable development that balances both planetary boundaries with social foundations, proposing that economies should operate within an ecological ceiling to avoid environmental degradation while ensuring every person has access to life's essentials (Figure 3).

Figure 1 The Doughnut of social and planetary boundaries (DEAL 2024)

This model aligns with the SDGs by clearly defining the ecological limits within which human activities must operate, ensuring that economic growth does not compromise environmental sustainability as outlined by the planetary boundaries concept, which includes climate change, biodiversity loss, and resource depletion (Figure 4).

Figure 2 SDGs are clustered into three pillars: economic, environmental, and social (Kostoska, 2019)[1]

Overall Aim of GreenTeach Training

The overall aim of the GreenTeach training is to equip VET teachers with the knowledge, green skills, and attitudes necessary to effectively integrate sustainability competencies (as defined by the GreenComp framework) into their teaching practices, curricula, and learning environments.

Learning outcomes

Upon completion of this training program, participants will be able to:

- Understand the GreenComp Framework: Articulate the key competencies and their relevance to VET education.
- Identify Sustainability Challenges and Opportunities: Recognize the environmental, social, and economic dimensions of sustainability within their specific vocational fields.
- Integrate Sustainability into Curriculum: Adapt existing curricula and develop new learning activities that embed GreenComp competencies.
- Employ Sustainable Pedagogies: Utilize teaching methods that promote critical thinking, problem-solving, collaboration, and action-oriented learning for sustainability.
- Develop Assessment Strategies for Sustainability: Design and implement assessment methods that evaluate students' GreenComp competencies effectively.
- Foster Sustainable Learning Environments: Contribute to creating and maintaining environmentally and socially responsible learning spaces within their institutions.

[1] https://www.mdpi.com/2071-1050/11/7/1961

- Collaborate and Network: Engage with other educators and stakeholders to share best practices and promote sustainability in VET.
- Reflect on Personal Practice: Critically evaluate their own teaching practices and identify areas for improvement in integrating GreenComp.

Thematic Overview and Recommended Topics of the Training

Considering the survey results, the following topics and sub-topics could be considered for the syllabus development:

1. **Foundations of Sustainability**
   - *Global Sustainability Challenge*: Exploring the concept of planetary boundaries; analysing key environmental issues: climate change, biodiversity loss, pollution; investigating social issues: inequality, poverty, access to resources, human rights; and examining economic issues: unsustainable consumption and production patterns, resource depletion, and the need for a transition to a circular economy.
   - *Key principles of sustainability:* Defining sustainability and sustainable development; explaining the three pillars of sustainability: environmental, social, and economic; and ethical dimensions of sustainability.
   - *Circular Economy*—This topic explores the concept of the circular economy: reduce, reuse, recycle, and recover. It also explores green business models.
   - *Standards and Standardization:* Definition for standards; Types of standards; Standardization organizations and their stakeholders; Designation and structure of a standard; Conformity assessment and certification against standards
   - *GreenComp Framework - Overview:* Introduction to the GreenComp framework and its significance for education; Understanding the interconnectedness and application of these competencies

2. **Sustainable Pedagogies and Teaching Methods**
   - *Flipped Classroom:* Theoretical framework; Strategies and models for implementing; Practical hints and tips, Examples
   - *Project-Based and Problem-Based Learning:* Theoretical framework; Differences; Strategies and models for implementing; Practical hints and tips, Examples
   - *Inquiry-Based Learning:* Theoretical framework; Strategies and models for implementing; Practical hints and tips, Examples
   - *Cooperative Learning:* Theoretical framework; Strategies and models for implementing; Practical hints and tips, Examples
   - *Design Thinking:* Theoretical framework; Strategies and models for implementing; Practical hints and tips, Examples

3. **Utilizing Technology for Sustainability Education**
   - *Digital Tools for Environmental Awareness:* Apps, games, and interactive platforms (like Earth School, iNaturalist, Google Earth) that promote sustainability education.

- *Gamification, Virtual & Augmented Reality for Environmental Education:* How VR/AR can simulate ecosystems, climate change impacts, or sustainable practices. Using game design principles to teach sustainability (e.g., Minecraft: Education Edition, Eco, SimCity).
- *Using AI for Sustainability Education:* Using AI tools to identify knowledge gaps and optimize content delivery for maximum impact. Using AI tools (like ChatGPT, image generation models) to create educational content, quizzes, infographics, or localize sustainability materials in multiple languages applying critical thinking principles and fact-chacking procedures.
- *Data-Driven Sustainability:* Using Sensors & IoT in Learning; Collecting and analyzing real-time data (air quality, energy use, biodiversity) using low-cost sensors and IoT.
- *Social Media & Digital Storytelling for Environmental Advocacy:* Harnessing platforms like Instagram, TikTok, YouTube to raise awareness and promote behavioural change

4. **Assessing GreenComp Competencies**
   - *Principles of Assessment for Sustainability:* Understanding the challenges and opportunities in assessing complex competencies like those in GreenComp
   - *Exploring formative and summative assessment strategies suitable for evaluating GreenComp:* portfolios, projects, presentations, debates, self-assessments, peer assessments.
   - *Designing Assessment Tools for Sustainability Competencies:* rubrics, checklists, and reflection prompts tailored to GreenComp competencies.
   - *Authentic Assessment Through Project-Based Learning*
   - *Digital Tools for Monitoring and Documenting Competency Growth:* E-portfolios, digital badges, learning journals, and mobile apps that help track sustainability learning
5. **Fostering Sustainable Learning Environments and Collaboration**
   - *Practical measures to reduce the environmental footprint* - energy efficiency, waste management, water conservation.
   - *Open Educational resources and platforms for collaboration and knowledge-sharing*
   - *Stakeholders working on sustainability at local, national, and international levels*
   - *Establishing Partnerships for Real-World Learning and Student Success*

Methodology to Produce and Deliver Training Solution

Technology is essential for creating interactive multimedia materials and ensuring they are accessible to VET educators (adult learners) who are geographically dispersed. Many of these individuals have work or family commitments that prevent them from attending courses on specific dates with fixed schedules.

Creating effective training and performance support tools involves utilizing instructional design models to outline the activities that will guide the development process. These models help

communicate the purpose and rationale behind a given strategy. A well-defined framework provides an overview of all the essential components that should be included in the course.

ADDIE (ADDIE, n.d.) is still one of the most broadly used design models. ADDIE stands for Analysis, Design, Develop, Implement, and Evaluate. Each phase of the model offers an opportunity for iterations and changes before moving to the next one. The ADDIE model adaptation used is presented in the diagram below.

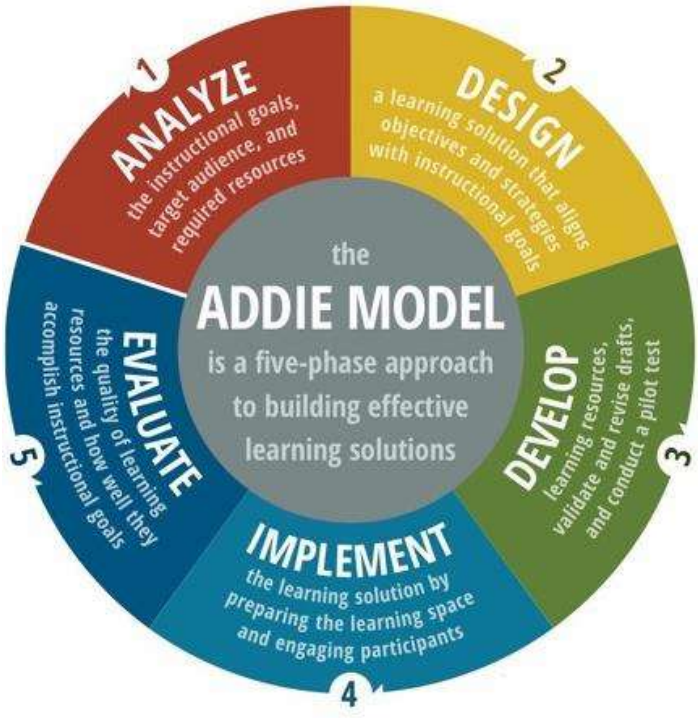

Figure 3 ADDIE design model

The next flow chart shows the different steps for setting up a learning project.

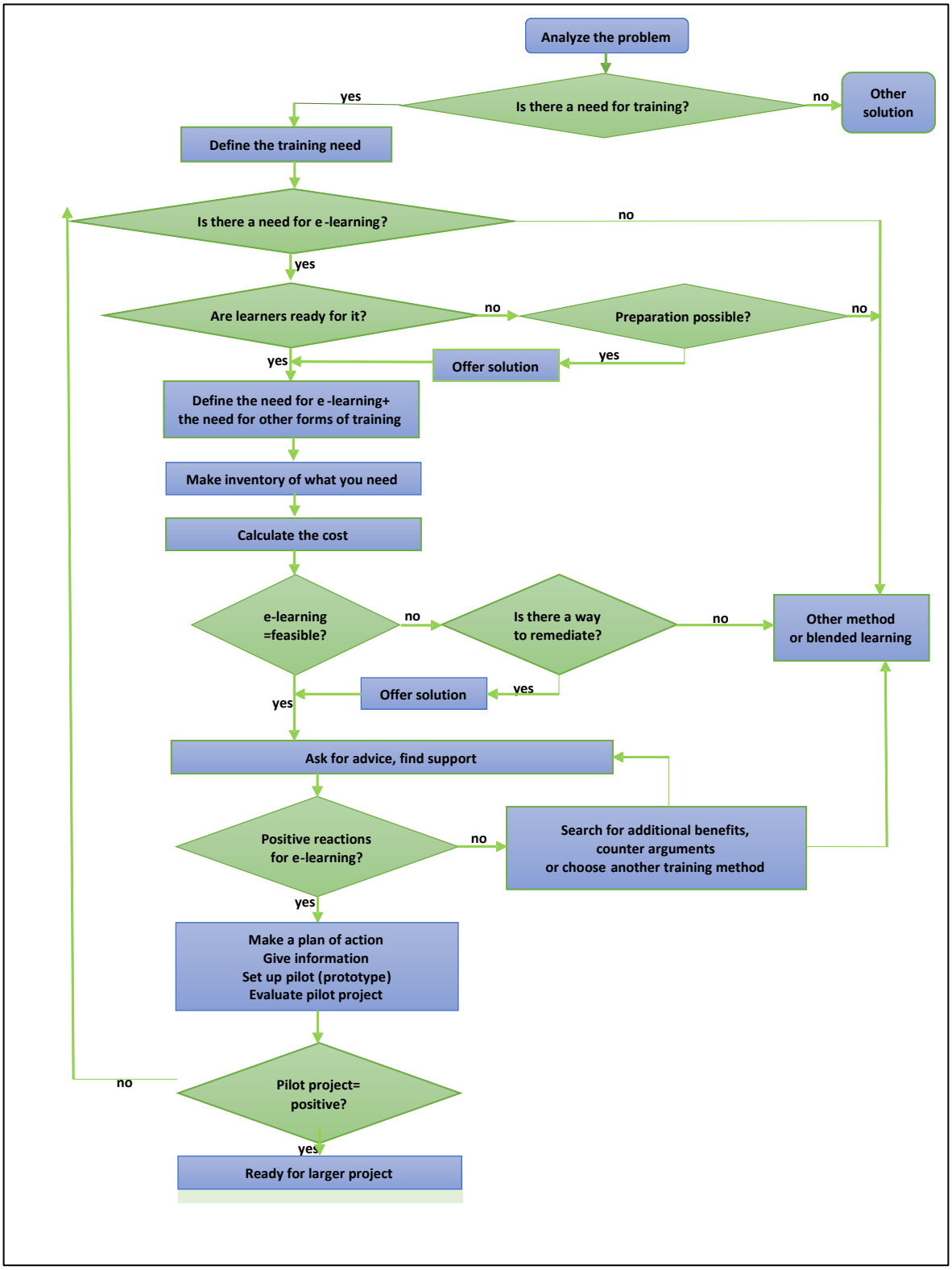

Figure 4 Steps for setting up a learning solution

The development of the training solutions should be done with special attention to the quality assurance and its enhancement. Below are listed some crucial factors in this regard:

- **Learner-centred content**: E-learning curricula should be relevant and specific to learners' needs, roles and responsibilities in professional life. Skills, knowledge and information should be provided to this end.
- **Granularity**: E-learning content should be segmented to facilitate assimilation of new knowledge and to allow flexible scheduling of time for learning.
- **Engaging content**: Instructional methods and techniques should be used creatively to develop an engaging and motivating learning experience.
- **Interactivity**: Frequent learner interaction is needed to sustain attention and promote learning.
- **Personalization**: Self-paced courses should be customizable to reflect learners' interests and needs; in instructor-led courses, tutors and facilitators should be able to follow the learners' progress and performance individually.

Moreover, e-learning is a convenient option for organizations in certain situations (e.g. when there is a need to reach many geographically dispersed learners).

In a self-paced e-learning course, learners can study course materials at any time they wish. This requires that learners have access to a set of interactive and self-contained materials. Facilitated or instructor-led e-learning takes place at a specific time and usually integrates self-study with collaborative activities such as discussions or teamwork.

Facilitated and instructor-led e-learning courses use communication tools which allow learners to communicate with facilitators and other participants in synchronous and/or asynchronous modes.

Both facilitated and self-paced e-learning activities and content must adhere to established quality standards to ensure the effectiveness of the learning program.

In a blended approach, e-learning sessions can be integrated with face-to-face (F2F) activities making use of the following advantages of this type of training:

- **Networking**: Although e-learning sessions have networking potential via chat rooms, messages and emails it is not as effective as having a real-life human interaction with another person where you exchange conversation.
- **Engagement and focus**: During the F2F sessions, trainees are usually in a classroom with a tutor (facilitator) who can implement strategies to keep them involved and engaged as much as possible, which will retain their attention and encourage better results.

- **Discussion and reflection**: During the detailed F2F discussions and debates regarding subject topics the participants may even learn from other people and take in viewpoints they haven't considered yet.
- **Instant feedback and problem-solving**: In case a problem arises when trainees are in a face-to-face session, they can simply ask the tutor (facilitator) to explain it better.

The Development and Implementation Team – roles and responsibilities

The following roles are generally required at different stages of the design and implementation processes: development leader, instructional designer, subject domain expert (SDE), online administrator, e-tutor/facilitator, web developer, media editor, and technical support specialist. Some of the roles described in the table below could be combined into a single job profile.

Role	Responsibility
Development leader/s	Coordination of all activities and roles in the different stages of the process and evaluation of the degree of transfer on the job and the results. HR and course development management.
Instructional Designers	Responsible for the overall instructional strategy. They work with the leader/s regarding the training goal specification and communication. Collaborate with SDEs to define which skills and knowledge need to be covered in the course, choose the appropriate instructional strategy and support the team in defining delivery and evaluation strategies.
Subject Domain Experts	SDEs are responsible for the course content development providing the knowledge and information required. They work in collaboration with IDs and IT staff to design and create LOs and define evaluation strategies. They can act as instructors and facilitators supporting on - and offline classroom activities. They can prepare and present learning material, assign tasks to the trainees and answer their questions.
Web developers and media designers	Web developers and media designers assemble course elements, develop media components, create the courseware, adapt the interface of a learning platform and install the courseware on a Web server.
Course administrator(s)	Manage learners' subscriptions and all activities related to the administration of the course.
Tutor/facilitator	Support participants' learning activities and motivate learners during the course; Create an environment that inspires participants' confidence in the learning process; Assure the flow of information among the different stakeholders. Motivate participation and facilitate and mediate participants' exchanges.
Technical support specialists	Technical support specialists are required to assist all participants in the training process (producers and users) at every stage of the process.

Table 1 Development team – roles and responsibilities

Ensuring homogeneity and a high level of efficiency and quality concerning the development and delivery of GreenTeach training necessitates the need for project team members (developers,

SDEs technical staff, trainers and facilitators, etc.) to improve and/or develop some psychomotor skills including the acquisition of practical perceptions and mastery in:

- the use of appropriate authoring systems to create interactive multimedia educational content (interactive multimedia micro-lessons).
- effective use of the functionality and tools addressed to the trainers integrated into the virtual learning environment (VLE), specifically designed to deliver e-learning GreenTeach sessions.

Training Design - Recommendations

Training methodology and strategy

The analysis of the targeted audience of trainees shows that the training sessions in a virtual learning environment enhanced with a limited number of face-to-face activities are a good option because:

- There is a significant amount of content to be delivered to learners from at least 4 countries.
- Learners come from geographically dispersed locations.
- Learners have limited mobility (limited time and/or resources to travel).
- Learners have limited daily time to devote to learning
- The participants should be involved in interactive workshops, practical activities, group discussions, case studies and self-reflection exercises to develop homogeneous background knowledge on how to integrate GreenComp competencies into their practices and subject domains
- Emphasis will be placed on learner-centered approaches and collaborative learning

Regarding the educational strategy, Microlearning seems to be the most suitable because:

- Microlearning is an educational strategy that emphasizes acquiring new information in small units. This approach breaks down topics into short, standalone segments that learners can access anytime and anywhere, allowing them to review the material as many times as needed.
- Microlearning is often a technology-based or technology-enhanced result-oriented form of training focused on essential content that is “need to know” instead of “nice to know” with specific objectives, smaller tasks, and measurable outcomes.
- Microlearning gives learners access to short bursts of new information that's engaging and digestible, as opposed to one large chunk of information that might be difficult to remember. The convenience of microlearning, from both the learner's and the educator's point of view, has made this type of instructional delivery popular in corporate learning environments.
- This approach enhances knowledge retention and empowers employees to develop new skills without taking time off work for training.

- Microlearning instructional units are designed to be completed in approximately 10 to 15 minutes, focusing on one specific skill or knowledge gap. Learners can complete their training at a time that best fits their schedule.

Course Development Process

When creating learning content, irrespective of the resource format (i.e. PowerPoint, video, audio, worksheets, case study, real-life examples etc.) the following structure should be adhered to:

- Step 1 – Introduction, Aims, and Objectives - introduce the title of the unit/nugget/resource; provide a brief description of the unit/resource; state the learning outcomes and outline the main content areas of the unit/resource.
- Step 2 – Key Learning Content - The actual learning content that is closely connected with the learning outcome and targets a very specific topic or thematic issue related to developing competencies
- Step 3 – Conclusion - Reflection & Transfer - some questions or statements to help the learner reflect the content against the background of their own development should be provided. Contextualizing the content in this way will foster the learning transfer, reaffirm what the learner has learned, and help to develop their confidence in their roles. Apart from the reflection questions some conclusions, practical examples, and additional readings should be provided.
- Step 4 – Assessment & Outlook – some tools for formative assessment should be provided (test questions, assignments, etc)

This structure follows common teaching methods informed by didactical principles and learning theory. By adhering to this approach, partners maintain high standards of quality, consistency, and relevance across the Curriculum. It ensures focused learning content aligned with specific outcomes, requiring content creators to thoughtfully plan their modules to achieve these outcomes. The figure below illustrates the content structure concept.

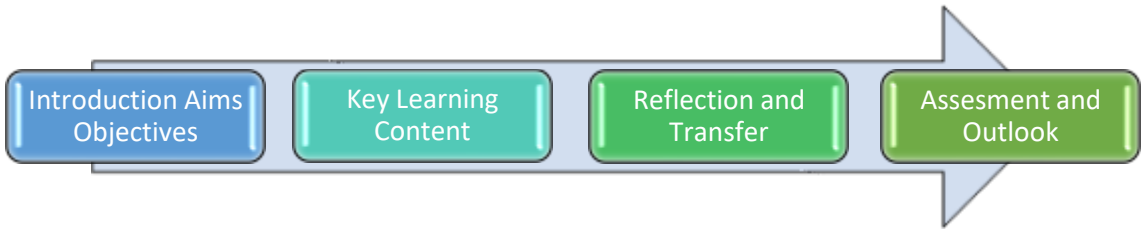

Figure 5 Content Structure Concept

Regarding the general principles that need to be considered when designing a learning resource, we would like to outline the following aspects:

- Ensuring that all content which is presented in a learning unit is accurate and that it is referenced where necessary.

- Content of the learning units must always follow clear learning objectives and goals and should be linked to resources that complement the unit content.

From a didactical perspective, the following should be adhered to:

- Problem-orientation: Theoretic models and content should be contextualized in a real-world setting so as to ensure that learning content is practical and relevant to the needs of trainees. Practical and contextualized content will help the involved trainees to apply it in their settings.
- Learning Outcomes for a given unit/nugget /resource should be clear and concrete .
- Referenced: It is essential that acquired knowledge is not only reflected upon but also referenced, linked, and expanded. Newly trained practitioners should be provided with a range of resources on similar topics that they can access as part of their self-directed learning. This will allow them to pursue further learning in a specific area if needed. Additionally, quality standards should be applied to these resources to ensure they have pedagogical value.
- Practice: To ensure the development of practical skills in learners, examples and exercises provided through the curriculum should be contextualized to real-life, practical situations and scenarios. It is therefore recommended that partners integrate round tables and team activities to facilitate the reflection and the development of a common vision. This will be also a good opportunity for learners to practice teamwork and networking.

Course duration

The course lasts for a total of 12 weeks, with a total of 76 hours of instruction, which breaks down to a workload of approximately 6 hours per week. This time includes reviewing learning materials, completing practical exercises, participating in assessment activities, and engaging in discussions. A kick-off workshop will be held before the training begins, and there will be a closure event once the training concludes. Throughout the training, each trainee will have the opportunity to receive consultations from the facilitators as well.

Courseware Structure

Regarding the learning content development - the usage of OERs and the provision of content in the form of learning objects (LOs), i.e. computer-based instructional components (items, practice items, and assessment items) that are combined based on a single learning objective but could be used and reused independently or in sequences in different educational contexts is fundamental. The developed learning entities have different levels of complexity, granularity, and reusability according to the following taxonomy:

- Raw Media Elements are the smallest level in this model: these elements reside at a pure data level.
- Information Objects are sets of raw media elements.

- Based on a single objective, information objects are selected and assembled into the LOs (lessons, topics, nuggets, etc.).
- LOs are assembled into Aggregate Assemblies that deal with larger (terminal) objectives. This level corresponds to the course modules.
- The developed learning modules can be assembled into larger collections, like courses and whole curricula.

Learning objects from lower levels of the taxonomy are assembled into higher-order collections such as modules, courses and curricula following the Learnativity Content Model shown in the next figure.

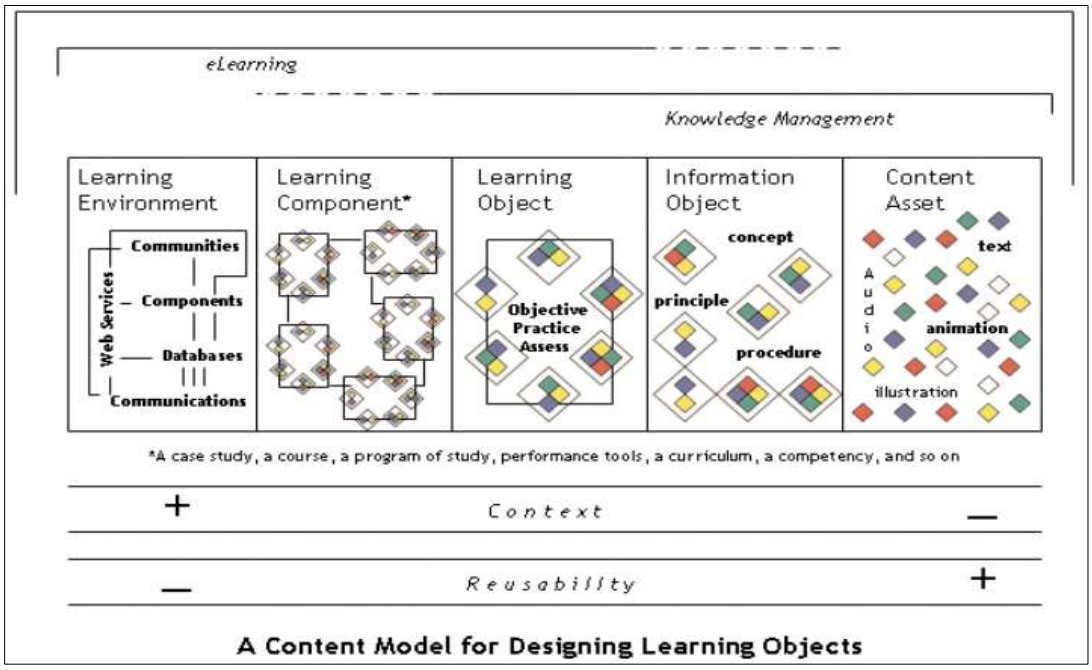

Figure 6 Learnativity Model - main principles and paradigms[2]

The LOs Set of the GreenTeach e-course includes content assets such as illustrations (pictures, schemes and graphics), texts, animations, audio files, etc. The following learning objects will be developed through the proper assembling of the available assets:

- Slides - PowerPoint presentations (developed according to the project PPT template provided) where a concrete course topic is presented through high-quality illustrative materials and compact but highly informative textual components.
- Lecture Script - textual documents presenting in detail the topic (and /or different perspectives of the contents already explained) of the course as a part of a defined modular structure.

[2] https://www.reusablelearning.org/about/Granularity.html

- Reflection questions - There are several different ways to think about using reflection questions with the students. The main types of reflection questions are:
  - process reflection questions
  - product reflection questions
  - feedback questions
  - self-assessment question
- The questions will be stored in the course's Question Bank and will be used to develop electronic quizzes related to the modules of the course.
- Quizzes are used to evaluate student understanding of the material covered by the corresponding module of the course.
- Storyboards are LOs which combine the developed slides' elements with texts. The storyboards will be used for the development of higher complexity LOs named multimedia lessons. The textual part connected with a given PPT slide further will be recorded as audio narration in a separate audio file.
- Multimedia Lessons are 10-minute videos developed based on the provided Slides and Storyboard objects (voice-over presentations in English with subtitles in all partner languages). In particular, the audio explanation will be synchronized with a slide presentation. They will be delivered to the trainees through a dedicated platform where the lesson can be navigated by learners everywhere and anytime.

The course modules are another kind of aggregate assemblies with more complex structure.

- Course Modules - The modules included in the GreenTeach course will be developed by the international development groups (IDGs). Each module consists of the following components:
  - Module description providing brief information about the module, its main goal learning outcomes, and instructors' contact information;
  - Multimedia lessons;
  - Lectures' Scripts;
  - Additional readings;
  - Assignment based on the provided reflection questions
  - Test.

The leader of WP3 (EU Track) in collaboration with the members of the development working group will create the course syllabus, distribute tasks related to courseware development among partners, and specify the quality assurance criteria related to the content (LOs) development. After receiving the developed LOs, they must be reviewed to ensure compliance with the specified Quality Assurance (QA) criteria (see Annex 1 where some QA criteria are proposed).

All developed and approved learning objects and course modules will be stored in collaborative project space to be integrated into the GreenTeach e-course and delivered to a geographically dispersed target audience through a customized virtual learning environment (VLE) established by BFU for this purpose.

The Delivery Method and Tools

Virtual Learning Environment

Virtual Learning Environments (VLEs) are increasingly being adopted as replacements for Learning Management Systems (LMS). The open-source software platform Moodle is now widely utilized by educational institutions for delivering online and blended learning solutions. Considering that all organizations involved in the partnership are familiar with Moodle, the GreenTeach VLE will be developed based on this software platform.

The VLE will be designed to provide a robust, secure, and integrated system for e-learning, allowing all participants in the training process to establish flexible and personalized learning paths. Additionally, the VLE will serve as a central hub, offering a social area with various collaboration and communication opportunities for all users, including project team members and other training participants, through integrated forums and a messaging system.

BFU will lead the activities related to registering and enrolling the trainees from partner countries into GreenTeach online training supported by the school partners involved in the project who to be responsible for selecting participants and providing the required data for them.

e-Course main sections and elements

- Welcome to the course: welcome message and course data structured as follows:
  - User Guide: Guidelines on how to navigate the course, how to use the services and tools integrated, how to communicate with the other participants, etc.
  - Course Presentation – what is the course about, prerequisites, learning objectives, learning outcomes, i.e. the knowledge and skills that students are expected to demonstrate upon completion of a course
  - Syllabus: The primary function of a syllabus is to provide the learner with details about the learning objectives and associated assessments for the course.
  - Evaluation System: Criteria for determining student grades; the number of exams and the weights assigned to each; how the final grading will be done.
- Module Sections (content and assignments): This area holds the core content. Each section has its overview, instructions, content, assessment, and summary.
  - Intro to the module – brief description of the scope of the module and learning objectives
  - Topic area:
    - Multimedia Lessons – SCORM LOs presenting the topics covered by the module
    - Lecture notes – textual documents presenting the topic
    - Slides – PPT presentation of the topic
  - Additional resources:

    - Online information resources – related to the topic articles, blogs, books, and etc.
    - Translated Lecture Notes;
    - Translated Storyboards;
    - Bibliography
- Reflection: reflection questions related to the module. These questions will be discussed during the local workshops.
- Assessment – the grade is taken into consideration.

The e-learning will also be supported by face-to-face tutoring activities. Each partner school will select one or more tutors responsible for facilitating, supporting, and monitoring national groups of learners.

Webinars

Webinars are ideal for allowing two-way communication between the tutor and the audience. The content in a webinar can be recorded and shared or repurposed in a variety of formats. Webinars also give audience members direct access to the instructor, which is both an enticing reason to attend and a way to build trust.

During the Kick-off webinar, the local piloting teams will introduce the local group of learners to:

- the GreenTeach platform – how to access the course, how to navigate the course content, how to communicate with the other participants in the training using the integrated services, and how to check their progress and results achieved.
- the GreenTeach course – the structure of the course, the syllabus, timeframe, evaluation system, etc.

The webinars can serve as a platform for initiating discussions based on the reflection questions provided by the course content authors. During these sessions, learners can share their opinions, experiences, and ideas related to important topics. This highly interactive activity will help contextualize the lessons learned by considering local dimensions and specifics at both macro and micro levels.

Additionally, participants can share any challenges they faced during the training and receive immediate support and assistance from their peers.

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Annex 1. Quality Criteria for Learning Objects Development

This section presents some important QA criteria regarding the development and approval of Learning Objects (LOs) which will be used for designing the GreenTeach e-course.

There are considered three main types of LOs as follows:

- Lecture Notes – textual documents presenting the given topic from the course in-depth and providing different hypotheses, opinions theories etc. as well as a list of additional readings and resources. These LOs will be in the form of .pdf files which could be downloaded and used in off-line modality by the trainees.
- Standard PPT presentations – Slides Objects – which accompanied the Lecture Notes Object.
- Multimedia Lessons – Interactive objects consisting of PPT accompanied with synchronized audio explanations.

Quality Criteria - Lecture Notes

The lecture notes represent in-depth studies to better detail one of the contents dealt with during the audio lesson or to provide students with a different perspective of the contents already explained. A specific template is provided (Lecture_notes_template.doc), the Lecture Note should:

- be composed of about 10-15 pages and structured in sections and paragraphs preceded by a coversheet, a table of contents and an introduction. It must be written using the specific form provided
- be written using the font, the colour and the size of the template
- contain all the information indicated for the cover page (e.g. title of module, title of lesson, name of the author etc.)
- respect intellectual property rights (sources are cited according to the template citing format specified) as well as all pictures used should be created by the author or used according to the reuse licenses' rules (in other cases the proper citing of the sources should be provided)
- be equipped with .png, .jpg, .gif pictures for best quality
- include captions for pictures and diagrams
- easily understandable (revision of text made by a mother tongue is strongly recommended)

Each chapter title must be numbered (e.g., 1 Title), and paragraph titles must also be numbered (e.g., 1.1 Sub-Title).

Footnotes should credit sources for borrowed, summarized, or paraphrased material, directing readers to specific page numbers in the Bibliography.

The lecture notes should end with a References section, including links and recommended sources (articles, books, etc.) for further study. A specific format must be used for these

references. Teachers should use a check grid to self-evaluate the format and features of the lecture notes.

The lecture note consists of about 10-15 pages	☐
The text has been written using "Calibri" font and respecting the size indicated in the template	☐
The cover page includes the name of the course, the name and number of the module, the name and number of the lesson and the name of the teacher	☐
The Table of contents is included and the number of pages of each chapter is correct	☐
The title of each chapter is anticipated by the number of the chapter	☐
The title of each paragraph is anticipated by the number of the paragraph	☐
Each picture includes a caption to explain it	☐
A chapter about conclusions has been included in the lecture note	☐
References have been included in the lecture notes and follow the specific format indicated in the template	☐

Quality criteria regarding the PPTs (Slides Objects)

The Slides Objects must be created based on the provided template and will be utilized for producing multimedia lessons; they will not be uploaded to the platform separately.

The Slides Object consists of 15/20 slides	☐
The content is written using the slide background of the official template	☐
All the slides have been written using the font, size and colours indicated in the template	☐
The first slide includes all information according to the template	☐
A slide introducing the themes to be explained in the PPT is included (Overview)	☐
One or more slides presenting some conclusions have been included in the PPT	☐
The name of the expert(author) and organisation are viewable and correct on the 1st slide of the PPT	☐
The title of the lesson is viewable and correct in the PPT	☐
The text is well-balanced and readable	☐
The citing (if any) are presented at the end of the PPT and are correct and according to the adopted format	☐
The usage of pictures/ diagrams and other illustrative objects is in line with the rules for respecting intellectual property rights	☐

Quality criteria regarding the Multimedia Lesson

Once the slides are ready, the expert will proceed in setting his/her Multimedia Lesson by using Adobe Presenter capabilities, specifically:

- the title of the lesson should be evident on the top-right of the screen and it should correspond to the syllabus;
- the name of the author should be put on the top-right without any titles (such as. Prof., Ing., etc.);
- the picture of the author should be inserted on the top-right side of the screen;

- a short biography should be prepared with titles, present occupation and degree achieved. It should be no more than 400 characters (spaces included);
- each item in the Overview should correspond to the title of each theme.

In order to ensure the respect of the criteria defined in the guidelines, the expert should complete the following check grid which guides them to self-evaluate some features and format of the multimedia lesson.

The Multimedia Lesson consists of 10/15 slides	☐
The content is written using the slide background of the official template	☐
All the slides have been written using the font, size and colours indicated in the template	☐
The first slide includes all information according to the template	☐
A slide introducing the themes to be explained in the Multimedia Lesson is included (Overview)	☐
One or more slides presenting some conclusions have been included in the Multimedia Lesson	☐
The picture of the teacher is viewable in the Multimedia Lesson interface (top-right side). Recommended weight for the picture: max 600 Kb	☐
The name of the teacher is viewable and correct in all the slides of the Multimedia Lesson (top-right side)	☐
The title of the lesson is viewable and correct in the Multimedia Lesson interface (top-right side)	☐
The hypertextual index (right side of the Multimedia Lesson interface) includes the title of each slide - theme (and not the simple indication of the slide number)	☐
Each topic includes an audio lesson of about 10 minutes	☐
The speech is easily understandable (recording made in a mother tongue is strongly recommended, with little noise or distortion, and the speaker should speak slowly and clearly)	☐

Quality criteria regarding the Platform

The GreenTeach Platform	☐
The first screen is easy to understand.	☐
The provision of a user guide is useful.	☐
When I see the first screen, it is easy to know what to do.	☐
The login is easy to do.	☐
The logout is easy to do.	☐
The menu for the course navigation is useful.	☐
The appearance is good.	☐
The navigation is friendly and simple.	☐
The overall organisation of the platform is acceptable.	☐
Viewing the learning content online is easy.	☐
The first screen is easy to understand.	☐