Learning Model

August 2022

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Contents

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1. Introduction

Since the 70s, when the population started to know how industrial farming affected themselves and the environment, organic farming has been growing (Meemken & Qaim, 2018). Nevertheless, still are some companies that opt for continuous industrial producing methods that use pesticides and chemical compounds that are harmful to health and the environment (Tang et al., 2021). This refusal to change their cultivation methods is promoted by the lower yield obtained in organic crops compared with industrial crops (**Figure 1**). Moreover, there are other factors described in (Reganold & Wachter, 2016) like powerful vested interests and existing policies, lack of information and knowledge, weak infrastructure and other economic challenges, misperceptions and cultural biases that can also be responsible for not moving to organic agriculture. Nonetheless, some studies have shown that organic farming could be more economically profitable than the conventional agriculture, and it has been demonstrated that in conventional cultivation there are more influences than economic and environmental ones, that can affect the transition to organic crops (Crowder & Reganold, 2015).

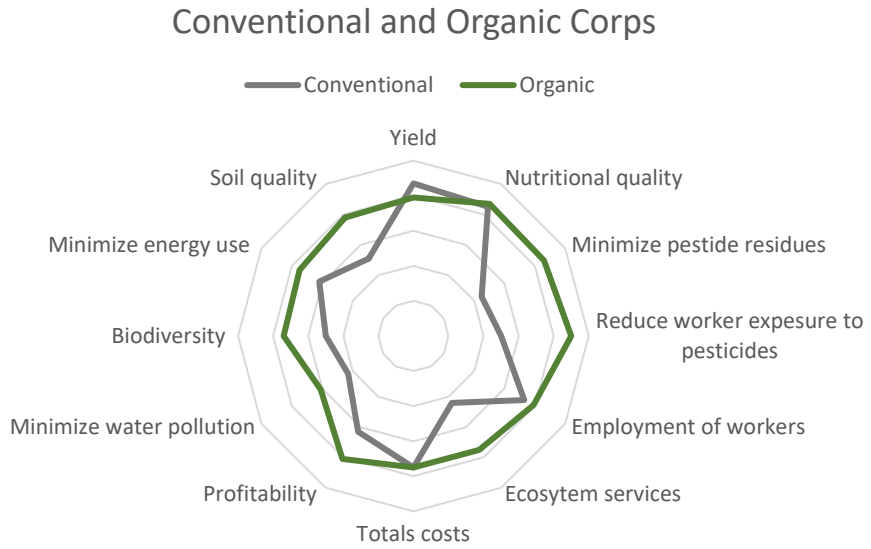

Figure 1. Comparison between a conventional crop and an organic crop. The circles represent a percentage (0, 25, 50, 75, 100%).

As shown in **Figure 1**, organic agriculture is better from many points of view. This is the result of the combination of environmentally friendly techniques supported by innovation and research of new farming methods. Therefore, it is so important to update the latest techniques and methods of farming to be competitive, especially considering that many advances are made in this sector every year. Moreover, apart from an optimal cultivation of the product and being up to date with the different production methods, socioeconomic factors must also be considered (such as product sale, marketing, price, employees, training, etc.). This knowledge needs to be transmitted to farmers, who are in this moment seeking to start a business and acquire the basis of a sustainable business that works.

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On the other hand, chestnut cultivation has a long history in all of Europe (Bento & Ribeiro, 2020). Spain, Portugal, Greece, Italy and France are in the top 10 producing countries worldwide from 1961-2019. In particular, Spain was the second worldwide chestnut producer in 2019 only beaten by China with a total of 188,930 tons (FAOSTAT, 2019). Moreover, chestnut production is usually associated to rural areas with low population density which are disappearing mostly because of rural exodus (Bento & Ribeiro, 2020). Furthermore, research is continuously evolving around this fruit and new applications for its valorization are appearing (Echegaray et al., 2018). In this context, the aim of the EcoChestnut project (formed by six European organizations) is to offer an innovative vocational training process to support the development of organic chestnut production in Europe, integrating into a common curriculum all aspects of development of organic farming, processing, and production of chestnut products. Its main output is an online comprehensive and tailored training course on organic chestnuts farming and products manufacturing, which will help to valorise this product and rural areas (EcoChestnut Project, 2020).

For the consecution of the main objective of the project, it was essential to develop a Learning Model that answered the main research questions (**Figure 2**). In this sense and given the complex reality of this project (six different countries and cultures) and current and future limitations (COVID-19 and future funding), an eclectic pedagogical framework was adopted. This means that different teaching methods are borrowed and adapted to suit the requirement of the learners, *i.e.*, a conceptual approach that does not merely include one paradigm or a set of assumptions. Instead, it is constituted from several theories, styles and ideas in order to gain a thorough insight about the subject and draws upon different theories in different cases (Churchill et al., 2013).

This document describes some guidelines for the design of B-learning courses for EcoChestnut project. These guidelines will be applicable to fully online, blended or digitally implemented courses and will help trainers to provide trainees with a satisfactory and effective learning experience. They will be particularly applied to situations when the traditional face to face lesson is changed for a virtual environment, allowing trainees to better interact in these new online situations. In addition, these recommendations provide approaches for designing online activities that will improve trainee enrolment and learning process (Urh et al., 2015). The EcoChestnut Learning Model will also provide information and guidelines for elaboration of high-quality content and will reflect the target groups' needs. The learning model is expected to answer different research questions such as which are the target groups, which would be the pedagogical framework, which communications facilities and services would be provided for trainees, or which shall be the role and place of the trainer during the training course (**Figure 2**). During the development of the courses, three principles will guide the evolution of the contents (**Figure 2**): (1) online content and learning activities will be as simple and cost effective as possible to facilitate the application of the model, (2) virtual environment will encourage relations between students and ease collaborative learning and (3) online and face to face learning environments will be combined to facilitate a common experience for students. Moreover, the process for reaching an effective and productive Learning Model was carried out following the next steps (analysis, design, development, and implementation) all together with partners' evaluation, as it is shown in **Figure 2**.

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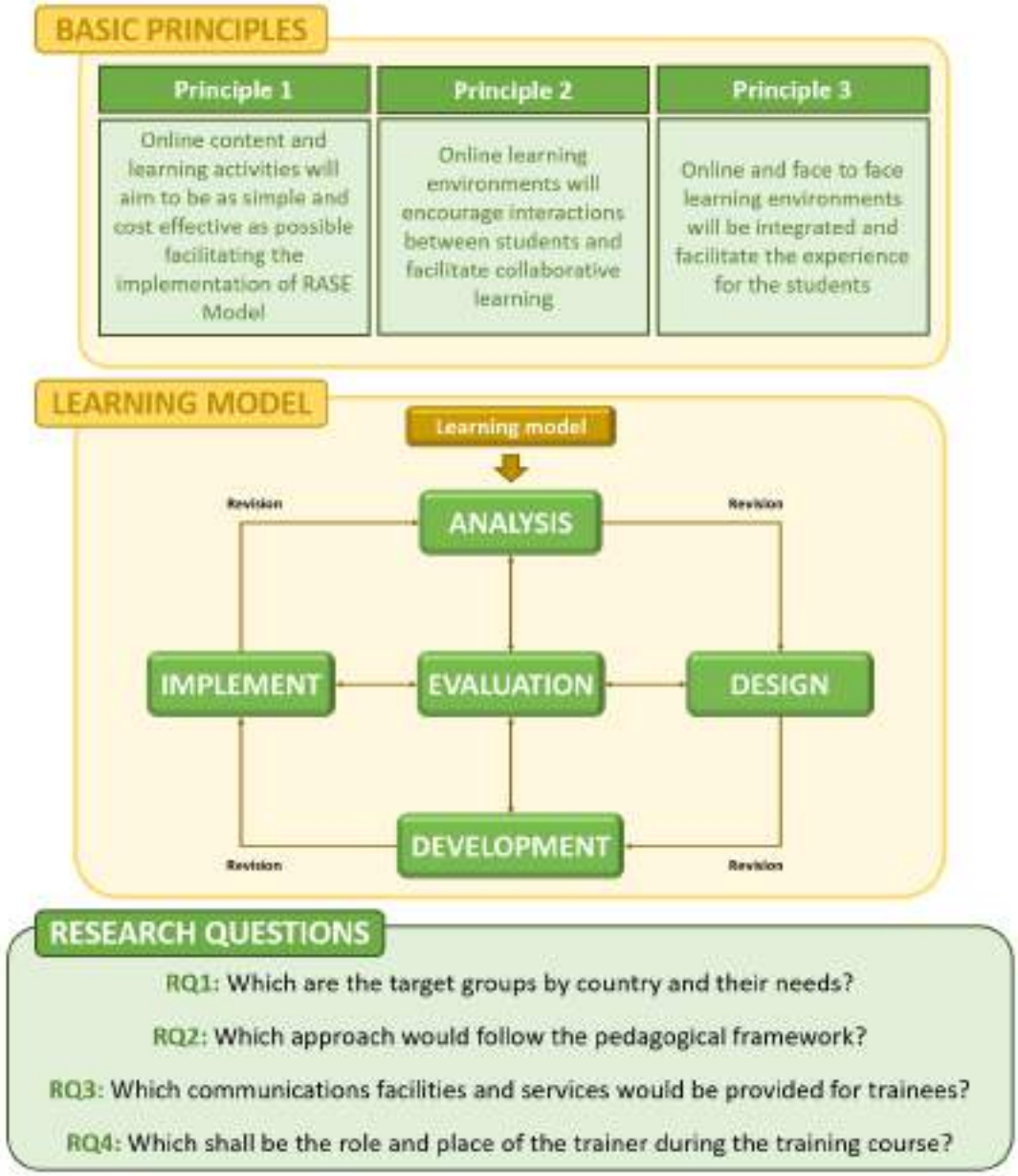

Figure 2. Learning Model basic principles, flowchart, and research questions.

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2. Materials and Methods

To develop this Learning Model for the EcoChestnut project, the following strategic guidelines were followed:

2.1. Materials

For the development of the Learning Model different materials were employed: bibliography (articles, pedagogy manuals, repositories, data basis, etc.) or feedback results resources (interviews, quizzes). For the continuous evaluation of the Model and given the current situation of COVID-19 pandemic, the project suffered a rapid virtualization, so information and communication technology (ICT) resources were employed. The virtual platform of the University of Vigo was used for the meetings with stakeholders and other partners, among others.

2.2. Research of the environment

Firstly, it was performed a study of the principal and current problems of chestnut crops and how experimented farmers deal with them. This study was carried out by means of a bibliographic search, study of the cultivated land and meetings with specialists and leading companies listening to all voices. Once the problems and points of interest were defined, they were divided into different modules in which the information would be exposed considering the social, economic, and environmental context, among others, of the potential users of the project. In this way, the main objective of the search was to adapt the actuality of chestnut cultivation, its problems and how to solve them in a way that is feasible for the largest number of people.

2.3. Lesson Plan Scheme

In the previous point, a large amount of information was collected. This entails a great challenge to transmit the information to the public with different characteristics and needs. Initially, the conditioned dimension of the project was to decide how big was the project going to be considering available resources. Then, the design of the pedagogical framework was performed. Based on the above, the structure of the training course was defined and complemented with the assessment and the learning tools based in the B-learning and RASE strategies.

2.4. Information collection and re-evaluation

This step is of major importance to continuously assess the fit between the training course and the Learning Model. So, once the training course was structured, a revision of the adjustment of the course to the Learning Model will be performed (still working on this stage). A peer review of all modules is being carried out to ensure the quality and understanding of the course. Moreover, the course will be tested with some volunteers outside the project to check the proposed tools, the accessibility of the online resources and the general contents of the course. In addition, at the time that the course is finished, we expect feedback from the community to improve the different difficulties that may appear. Finally, it the strategy of dissemination of the course and exploitation of results will be defined. For the analysis of the recovered data, documents and content was performed according to (Bardin, 1996).

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3. Target groups and needs

EcoChestnut project will develop a multidisciplinary, interactive, and comprehensive B-learning training course in production and marketing of organic chestnuts and chestnut products (OCCT) and promotion of OCCT as a specific and traditional product and practice. The project is targeted to develop and enhance the competences in chestnut producers of the following 3 specific target groups.

The course will be directed towards different profiles, that can be classified into the three main groups listed below:

1. ***Chestnut growers & chestnut products companies***. These are people wishing to converse to organic farming but lacking comprehensive and integrated training materials with detailed information for each step of the process, thus minimizing the risks they would take.
2. ***New chestnut entrepreneurs***. This group refers to people who does not come from agricultural world, as new incomers now represent nearly 50% of agricultural installations in countries such as France, Spain, Portugal, or Greece. As they did not pass through the traditional agricultural training systems, they are not always well recognized or identified by professional agricultural organizations supporting traditional chestnuts producers. Thus, above all others, these new incomers need technical support and quality training tools to fully understand the production process they intend to invest in.
3. ***Multi-skilled farmers*.** These are those who can make an interesting supplementary production to allow the reuse of the traditional (old) chestnut groves.

3.1. Target groups by country

It is important to know the target groups by country since EcoChestnut Learning Model can obtain information for them by surveys and different promotion events. Each partner developed a list of its specific target groups, but which mainly correspond to the three previous groups and public or private organizations for these collectives. For the consecution of the Learning Model, their specific needs were considered and will be also considered when the dissemination and promotion of the course starts.

3.2. Stakeholders by level

These organizations are identified as project stakeholders or indirect beneficiaries on different levels. They have significant networks on regional, national, and international level and will be able to further promote EcoChestnut outputs among their members in all regions of partners' countries.

Table 1. Compilation of stakeholders depending on their level.

Regional level	National level	International level
-Regional development agencies. -Regional agencies in agriculture. -Regional agencies for tourism & cultural heritage. -Regional associations of chestnuts producers.	-Ministry of Agriculture that is managing the agricultural production at centralized level. -National associations & professional unions of chestnut farmers & chestnut products producers.	-Organizations working predominantly with chestnut producers/organic farmers like consultancy companies, professional associations, NGOs, etc.

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-Regional public & governmental structures that work in the field of agriculture & chestnuts & organic products. -Municipality departments to support regional economy. -Chestnut producers & farmers on local level. -Local authorities since they organize trainings or other events for farmers. -Organizations working predominantly with chestnut producers & organic farmers like consultancy companies, professional associations, NGOs, etc. -Different local educational institutions like VET centers, VET providers, etc.	-National associations for organic agriculture. -National association of producers of bio- & organic products. -National associations of entrepreneurs. -National associations of professional trainers. -National bodies on tourism & cultural heritage. -National agencies and other administration structures that work to support & enhance agricultural development incl. cultivation & production of organic products. -Universities, colleges, high education providers, nation-wide VET centers, etc. -Policy makers in agriculture & chestnuts/organic production. -Non-governmental sector.	-International agencies in different fields: agriculture, tourism, cultural heritage, etc. -International policy makers in agriculture & chestnuts/organic production.

3.3. Needs of the chestnut producers

As chestnuts producers are one of the main target groups, their needs are fundamental to design the contents, structure, and development of the course. Here, a list of some of these needs is presented:

- Turning chestnut production into organic chestnut production.
- Planting techniques and pest control.
- Certification of national chestnut trees (DNA identification).
- Motives for replacement of elderly trees with younger ones.
- Planting chestnut trees of more efficient varieties.
- Planting new chestnut forests where climate and soil are appropriate.
- Unstudied chestnut varieties to be evaluated and so, be certified.
- Policy consistency on chestnut issues, such as certification of trees DNA or replacement of old trees etc., among others.
- Infrastructure for high quality sorting.
- Infrastructure for appropriate chestnuts' conservation.
- Establishment of industries of chestnuts derived products and other strategies (packaging, transforming and conserving chestnuts), to be available on market all year in various forms.
- Better chestnut trade practices.
- Investments on chestnut transformation into other products.
- Chestnuts' transformation into other products, such as flour, pasta, sweets, honey, beer, etc. as Adding value to the primary product: multiplying its value times up the original sale price.
- How to achieve Protected Designation of Origin (PDO) certification of a product.
- Seminars on chestnut production, trade, and marketing from educated specialists.

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Ref : 2019-1-FR01-KA202-062276

- Promotion of chestnuts' beneficial nutrition evidence.
- Use of chestnut for agritourism promotion, especially at the time of harvest with chestnut festivals and other happenings.
- Chestnut festivals and other chestnut happenings for promotion of its good nutrition facts as well as its good trade chances.

4. Pedagogical Framework

The Pedagogical Framework for EcoChestnut is eclectic. It means that different teaching methods are borrowed and adapted to suit the requirement of the trainees. The EcoChestnut project offers a flexible application process, depending on the needs and possibilities of each institution. In general, most of the course will be taught online (remote modality) to be the most accessible possible for everyone. The modules will be available at the online platform together with a final test for online assessment, but case-studies, debates or other activities will be developed online individually or in group. In this case of remote learning, the trainer will interact with the trainee through the forum and/or fixed tutorials via email or others to solve any doubt that may arise during the learning process of the trainee. The trainer is expected to encourage the interaction through the platform via forum (in the case of remote modality) or in the face-to-face sessions. However, there is also the possibility of adapting to a Flex Model combined with exceptional face-to-face sessions. This way, if some countries are capable and find necessary or enriching to have face-to-face learning seasons; whereas other find unnecessary or unfeasible to carry out this type of lessons, their model will be adapted to each situation and count with all support gathered in the Learning Model.

4.1. The B-learning Model

Blended Learning (B-Leaning) is a flexible approach to the design, develop and deliver a learning and teaching strategy. This model combines a novel virtual and a traditional face-to-face learning, one feeding from the other. In blended courses, teaching can take place in the classroom, online or in both situations. The online element progressively becomes a natural extension of the traditional classroom learning process. A scheme of how blended learning integrates different types of learning and teaching experiences (traditional face-to-face and virtual) is shown in **Figure 3**. Moreover, B-learning does not impose a fixed pedagogical framework but has the potential to support learner-centered approaches to learning on complex adaptative frameworks (C. R. Graham, 2006).

There are two main modalities of models:

- ***Remote (Virtual or Enriched Virtual) Model***. In this model, trainees are not enrolled in a virtual school, but rather work on coursework remotely and still show up to their brick-and-mortar school/University for some face-to-face learning sessions. This typically places the trainee on a unique, 'non-traditional' schedule.
- ***'Flex' Learning Model.*** In this model, trainees work through online lessons at their own pace while in the brick-and-mortar classroom with the trainer available for support, guidance, and one-on-one instruction as well. This model truly gives trainees substantial flexibility and ownership over their learning.

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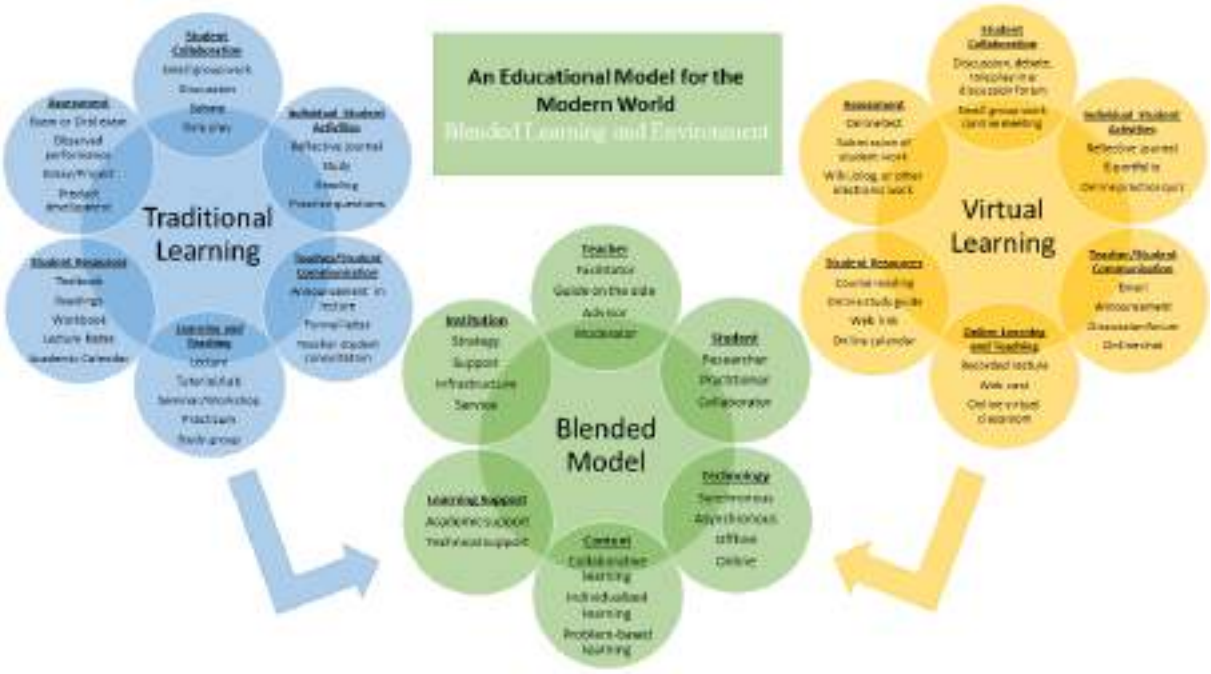

Figure 3. Diagram of the Blended learning model.

In this case, EcoChestnut project offers a ***Flexible Application Process***, depending on the needs and possibilities of each institution. In general, most of the course will be taught online (remote modality) to be the most accessible possible for everyone: the modules will be available at the **E-learning platform** together with a final test for online assessment, and case-studies, debates or other activities will be developed online individually or in group. However, there is also the possibility of adapting to a Flex Model combined with exceptional face-to-face sessions. This way, if some countries are capable and find necessary or enriching to have face-to-face learning seasons; whereas other find unnecessary or unfeasible to carry out this type of lessons, their model will be adapted to each situation and count with all support gathered in the Learning Model.

4.2. The RASE Model

To successfully achieve trainee productivity and satisfaction it is essential to develop a practical and demonstrated Learning Design that can ensure trainees participation together with the application of technology. This learner-centred-learning design model is formed by 4 components: Resources, Activity, Support and Evaluation and so, it is called RASE (Churchill et al., 2013). A simple scheme of how RASE Model integrates different aspects, and their interactions is shown on **Figure 4**.

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Figure 4. Design of RASE model. Examples of different resources and activities, sources of support for trainees and advantages of evaluation process.

In this perspective, it is essential that trainers define which are the specific course learning outcomes before the start of the course and that they are aligned with the program. For this purpose, a Lesson Plan Scheme document will give the details of the course based on a common template that will cover all the aspects that must be addressed during the development of the formative units of the course. These learning units should include:

- Competences.
- Attitudes and values.
- Learning outcomes.
- Roles of the trainer and trainee.
- Prerequisites or previous knowledge requirements.
- Contents (conceptual, proceeding).
- Tasks and activities.
- Deliverables (artifacts to be produced).
- Organizational resources (groups and timing).
- Evaluation: criteria, standards, and instruments (rubrics).
- Support and mentoring.

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- Resources (bibliography, presentations, demonstrations and recorded/virtual and real lectures, videos, software tools, platform, ICT, games).

The RASE Model is aimed at combining to approaches: i) teaching and ii) learning. From the first approach, it is derived that the Learning Model will assist trainers to put the trainee in the center surrounded by different educational technology tools. From the second approach, the model aims at supporting the support the student during the learning process of the theoretical and practical contents and the development of new knowledge (Churchill et al., 2013). This model is based on those characteristics considered as essential to ensure quality during learning and teaching. Furthermore, RASE states that only the content or resources are not enough for the achievement of the learning outcomes and thus, it is imperative to also consider:

- **Resources**: it is aimed to provide the contents and tools the trainee should acquire.
- **Activity**: based on problem-based learning (PBL), they will combine the performance of projects, problem solving, study cases or other tasks to achieve specific learning outcomes.
- **Support**: it is directed towards helping the for trainees with different tools (without contemplating common interactions with other trainees) including peer, tutor, and technology support.
- **Evaluation**: it is aimed to provide tools to guide trainees' progress and understand the knowledge acquirement process, what do they need to improve the acquisition of learning outcomes and how they are evolving.

4.2.1. Resources

Regarding the resources, they can be included in three variables: ***a)*** **contents** (*e.g.*, presentations, lectures, journal articles, digital media, etc.) and ***b)*** **tools**, that learners use when working on their activity, *e.g.*, mind maps, statistical analysis software, word processing software. At this point, it is important to include non- traditional resources such as videos (recordings, screencasts, webinars, etc.), eBooks or PDF files, presentations or slides, quizzes, blog posts, audio files (talks, podcasts, interviews, etc.), graphic design, etc. Furthermore, it is important that when integrating technology resources in training, it should be done in a way that leads trainees to learn with, rather than just learn from these resources (Churchill et al., 2013).

4.2.2. Activities and tasks

Activity is a key component for the achievement of the learning outcomes. It provides trainees with an experience where learning occurs in the context of emerging understanding, assessing ideas, and applying knowledge. The following are two key characteristics of an effective activity: ***a)*** An activity must be **'trainee-centered'**: focused on what learners will need to do to learn instead of what they will remember, trainers will facilitate trainees to participate and trainees will produce artifacts that validate their learning progress; ***b)*** An activity must be **'authentic'**: it will contain real-life scenarios and defined problems, reassemble professional practice and use specific tools and result in artifacts that demonstrate professional competence, not only acquired knowledge. Some examples of these type of activities will be a design project, a case-study, a problem-solving learning task, a poster or a role-play debate (Churchill et al., 2013).

Artifacts produced by trainees should undergo a revision and support process before final submission and might involve online presentations. These artifacts will be evaluated by using different tools so that

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trainees will receive feedback (from trainers, peers, and/or invited experts from the community/professions.) about their works and perform the pertinent changes towards the fulfilment of the learning outcomes.

4.2.3. Support and mentoring

'Support' provides trainees with a reference help while allowing them to develop by themselves the learning skills and independence sense. Support can be broadly categorized into pedagogical, administrative, and technical. For trainers, support and mentoring reduces redundancy and workload since it is aimed at anticipating trainee difficulties, tracking, and recording these ongoing difficulties and issues that need to be addressed during learning as well as sharing them with trainees. Three modes of support are possible: trainer-trainee, trainee-trainee, and trainee-artifact (additional resources). Support will be carried out through the online environment or in face-to-face lessons when possible (Churchill et al., 2013).

Depending on the course, different support structures can be planned and implemented considering the anticipated needs. The objective of this anticipated support is to facilitate to trainees a set of resources that they can access when needed, rather than just being dependent of trainers for help. With this aim, some specific strategies will be developed such as the creation of a FAQ Page and a Glossary of course-related terms for the course. Generally, support should be aimed at leading trainees to become more independent. Trainers should give frequent, early, positive feedback that supports trainees' beliefs about their capacities, but they also need rules and parameters for their work.

4.2.4. Evaluation: peer and self-evaluation and rubrics

Evaluation of trainee learning during the course is imperative for an effective trainee-centred learning experience. The evaluation needs to be formative to enable trainees to constantly improve their learning. An activity should require trainees to work on tasks and develop and produce artifacts that evidence their learning. This evidence of trainee learning enables the trainer to monitor trainee progress and provide further formative guides to help improve trainees' learning achievement. Also, a self-evaluation quiz so that they can assess their own learning.

4.3. The role and place of the trainee and trainer during the training course

Trainee: B-learning studies have confirmed the transformation of trainees from being passive to becoming active participants in learning. This is a result of undergoing a dynamic, adaptive process of change as they interact with other subsystems in the multimodal learning environment.

Trainers: They co-evolve with other subsystems, particularly with learners, to become a generation of trainers with new identities and multi-disciplined professional skills. There are many new labels that describe this generation of trainers, for example, e-moderators (Salmon, 2007), facilitators, guides on the side, and advisors, among others.

In this course, the trainer has ***more functions as a supervisor than as a teacher***. Despite they could be online lessons, recorded lessons, or if it is possible some face-to-face practices by the trainers to explain the theory, the trainers will supply assistance to trainers when they need it. The trainer will follow an e-moderation model that is based on the minimum intervention. E-moderating is based on the 80:20 rule where "20% of our e-moderating work produces 80% of the results" (Salmon, 2007). Moreover, our trainers must think in a constructivism way, where the knowledge is acquired by the trainees and trainers

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help to develop their ideas (Daggar & Yadav, 2016). In e-monitoring, there are 5 stages where the e-monitor has different functions a must afront different situations.

1. ***Access and motivation***
   The objective in this first step is that all users have access to all the material, that users feel comfortable with the E-learning platform and that they are encouraged to participate in the different group tasks (if available) and forums that will be given throughout the modules. To meet these goals, the E-trainer should give the welcome to the users (online or by video), congratulates the user for entering the course, and encourage trainees to participate.

2. ***Socialization***
   In socialization, the E-moderator will help to create effective groups and prepare all the material for the lessons or the different activities that will be done during the module. To maintain a positive learning environment, the trainer will admire and congratulate the groups for their work but without overwhelming by constant interventions.

3. ***Information exchange***
   At this point, the users will be able to follow the course with the instructions given so the trainer will give more space to the users to develop their ideas and acquire knowledge individually and in a group. Nevertheless, trainers should encourage participants to work on their own doing their summaries and schemes but always in alert to help or teach only when the user needs it.

4. ***Knowledge construction***
   During the knowledge construction, trainers should enable collaborative working by providing information and trying to support only where and when is necessary. Moreover, E-monitoring allows giving feedback to the users to enable knowledge construction. To encourage autonomous <work, the trainer should avoid the temptation to intervene.

5. ***Development***
   The development stage is so important, and the trainer should pay attention to the group reflections and to the application of learning in different activities to promote the critical thinking of the user and make sure that the knowledge was well learned. At this point, the feedback of the trainer and the users must be at its higher point because will be the moment to finish the course, despite after de course the communication between users and between the user and the trainers that It does not have to break because feedback is expected to improve the course and to solve future problems.

4.4. Other Strategies for the Pedagogical Framework

4.4.1. The Flipped Classroom Model

The recent increase in the adoption of the Flipped Classroom Model represents innovation in content delivery in B-Learning. Almost all the studies into the flipped class have confirmed that short and concise pre-recorded video lectures allow trainees to learn the content in greater depth and at their own pace outside the classroom. In turn, such a thorough understanding of the content facilitates more effective classroom learning as trainees can more easily apply what they have learned from the video lectures outside class (Forsey et al., 2013). This way, face-to-face lessons or other support becomes a venue for further consolidation of content comprehension (Tune et al., 2013).

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Ref : 2019-1-FR01-KA202-062276

"This change in delivery format allowed trainees to spend the majority of class time conducting small-group learning activities, such as case studies to promote communication, problem solving, and interpersonal skills" (Ferreri & O'Connor, 2013). Improved learning and better performance were also reported (Ferreri & O'Connor, 2013; Missildine et al., 2013). This approach to the Flipped Classroom Model could be applied virtually with some modifications or considering face-to-face lessons when possible. For instance, as in the case of the Module of Practices and Practicum (optional).

Due to the complexity of working with different target groups, the tasks will be assimilative with assessment focused on re-production of knowledge through quizzes. However, EcoChestnut will try to follow, when possible, a Pedagogical Framework based on Cognitive Apprenticeship, Problem Based and Dialogic Approach. For example, in the Module of Practices, the courses will include several experimental, information or communicative tasks, which will imply the use of different assessment tools, as it is collected in **Figure 5**.

Figure 5. Assessment tools for the different experiential, information, and communicative tasks.

4.4.2. Learning Support and Institutions

If needed, the trainees could ask for specific learning support from the trainer. It is considered to contain two kinds of support:

- **Academic support** focusing on helping learners to develop effective learning strategies, such as time management and collaborative skills.
- **Technical support** aiming to help trainees improve their knowledge of the technological tools and the fluency with which they use the tools to complete specific learning tasks.

The development of learning support mechanisms should be informed by the needs of the learner, effectuated by the expertise of the trainer, needed by the constant advances in technology, and ensured by institutional support. The need for "deeper subjects such as course content or an assignment" and support should occur through multiple methods but the most common is by email, or web-based tutorials (Moskal et al., 2013).

EcoChestnut project is expected to bring attention to the necessity for the provision of such support, because it is an important factor affecting the learner, the trainer, the effective and efficient use of technology, and the institutional support. To some extent, such support can determine the degree of success of B-learning. In **Table 2** a list of the area and kind of support that trainees may need, and the description of those associated difficulties is shown:

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Table 2. Summary of the trainee support for online learning.

Area of support	Description
Expectations	Service standards should be clear and easily available to online learners.
Information and administrative support	Experience shows that students who opt to study online commonly expect to be able to complete administrative processes, such as registration for example, online. User guides are recommended as support material. Also, it is recommended that regular student satisfaction surveys are conducted to ensure that administrative requirements are not a barrier to learning.
Technological support	Students need to know what technology requirements are needed prior to registration. Even so, students are likely to need ongoing technological support and this support should be clear and readily available.
Study skills assistance	Sometimes online trainees are adults returning to learning after some time away, while open learning courses might encounter students with little prior experience of post-school learning, or students might have not experienced online learning before. For this reason, support regarding the specific types of learning and study skills needed in an online environment is needed. This includes time management and study schedules, assistance with balancing educational and other life demands, tools to provide peer assistance and collaboration, assistance in working with digital and online learning materials, information about plagiarism and how it can be avoided, and assistance with the use of online library searches and other means of finding information.
Online educational counselling	Educational and career counselling can be provided in a web environment. Well-prepared online resources (usually asynchronous) can assist students who might not have access to a counsellor.
Ongoing program advising	Support in terms of learning pathway organisation and how best to spread coursework depending on the context of the specific trainee is important.
Access for students with disabilities	In an online context service such as alternative formats for learning materials, advice about assistive technologies, referrals as needed, and learning accommodations (within the bounds of regulations and policy) should be made available to online students with disabilities.

EcoChestnut project is expected to bring attention to the necessity for the provision of such support. Support and mentoring can affect the trainee, the trainer, the correct use of technology, and the institutional support. To some extent, such support can determine the degree of success of B-learning. Furthermore, to sustain B-learning, other supporting mechanisms should be provided at an institutional level, including strategies, policies, and services (Charles R. Graham et al., 2013). These mechanisms are interconnected and informed by the trainee, the trainer, the technology, the content, and the learning support.

4.4.3. Motivation Promotion: Technology and Gamification

The present B-learning model, mostly based on a virtual or online approach can present some drawbacks: sense of social isolation which leads to lower motivation and high drop-out rate, lower interactivity (limited options for direct interaction between the trainer and trainees), limited options for direct and timely feedback, lower control over assessment and required high level of self-regulation. For this reason,

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different organizations have highlighted the figure of the facilitator, as its role is fundamental to keep motivating, teaching and problem solving during all the process, in this case, the training model.

In this sense, some attention should be paid to the trainees' attitudes towards the use of technology and their ICT competence. Our trainees will use mainly "Online" training resources. Videos are a good resource (they must be subtitled) and this technology should be accessible to all capabilities. Also, there are other more contemporary approaches such as Gamification. This methodology is very effective in formal and informal learning settings, also for adults. According to the suggestions from game developers, game dynamics is a combination of players' (trainees') behavior and their emotions which are created by game mechanics, and by interaction with other players (trainees). Game dynamics gives players a reason to keep on playing or learning (Kim et al., 2018). Combinations of mechanics and dynamics are ways to introduce gamification in a B-learning project.

- **Gamification mechanics**: scores, ranks, badges and trophies, team, or individual tasks, unlocks, visualized dashboards or progress bars, avatars profile, notifications, course currency, etc.
- **Gamification dynamics**: achievement, competition, challenge, progress, collaboration, surprise, collection, etc.

At last, student interaction is one of the most important aspects of learning that can be lost in virtual training. Some strategies for promoting trainee's encouragement are below in **Figure 6A** as well as other strategies that have been proposed for working in group learning activities in **Figure 6B**.

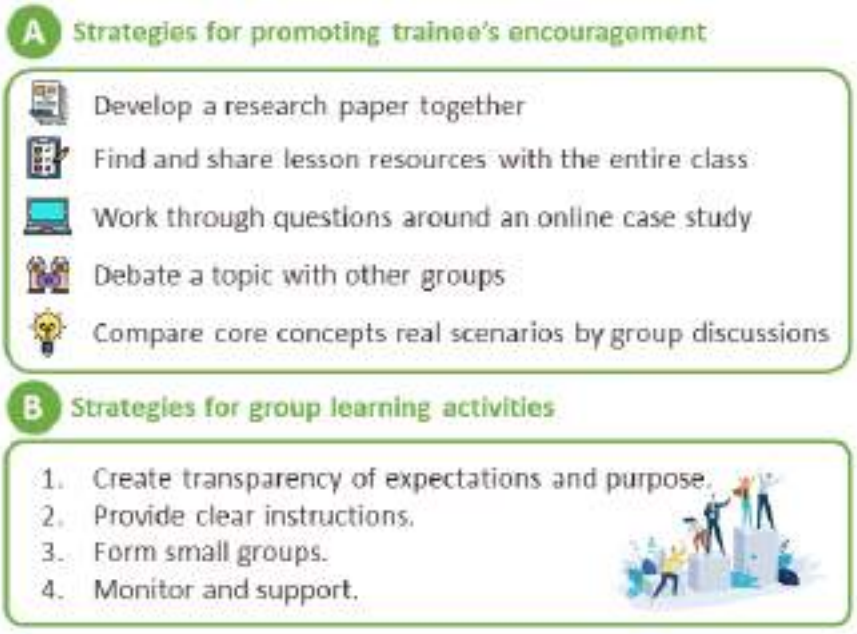

Figure 6. Examples of trainees' interaction and Strategies for group learning activities.

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5. Structure of the training course and assessment strategy

5.1. Training course characteristics

The course will be unique for all target groups, countries and territories with slight modifications depending on the needs of each partner. Trainer will adapt contents depending on end-user needs according to the main three target groups. The learning model will follow the statements of the B-learning model. The scope will be holistic, multidisciplinary and intersectoral. Didactic methodology will be practical, active, interactive, non-formal and co-created with trainees when possible. For mentoring, 2 mentors will be needed.

The course will have a duration of 80-100 learning hours. Considering that "learning hours" differs from "teaching hours", as they include: self-learning, online tutoring, developing of tasks and projects, presentations, practices, and internships, among other possible learning activities. Course will combine self-studying with online sessions with a trainer. To begin with, the course will be divided into 4 main sections (divided in 18 modules) (**Table 3**).

Table 3. Theory division and estimated work hours per section.

Topic	Axis	Hours	Modules
Production	1 - How to produce organic chestnuts?	**25**	1.1 - Planting and grafting 1.2 - Fertilization and management of the agricultural soils 1.3 - Trees pruning and conduction of the plant 1.4 - Irrigation of an organic chestnut plantation 1.5 - From harvesting to storage 1.6 - Methods of Products processing with organic certification
Pest control	2 – Biological and biodynamic treatments in chestnut farming	**10**	2.1 - Weed Management and Control 2.2 - Protective measures against pests, parasites, and diseases 2.3 - Biodynamic principles applied to disease prevention fortification for cure
Marketing	3 – Commercialization and marketing in chestnut farming	**25**	3.1 - Principles and tools for marketing in the organic sector 3.2 - Marketing approaches and strategy 3.3 - The essential elements and tools of digital marketing 3.4 - Essentials of today's marketing: Social media, Fairs and Networking 3.5 - Elements of economic analysis on the profitability of organic production
Culture heritage	4 – Organic chestnut farming, a driving force for rural development in Europe	**20**	4.1 - Tangible and intangible heritage of European chestnut farming 4.2 - Organic chestnut farming and the tourist economy 4.3 - Environmental and landscape value of organic chestnut farming 4.4 - Organic chestnut farming, a vector of social cohesion

This scheme is susceptible to be modified as the distribution of the modules and units will be based on partner's experience, professional know-how and competence in the area. Other possible contents are not clearly included yet such as product valorisation in rural communities, chestnut as an opportunity to fix population in the rural, chestnut as a means of managing the mountain creating a system of high

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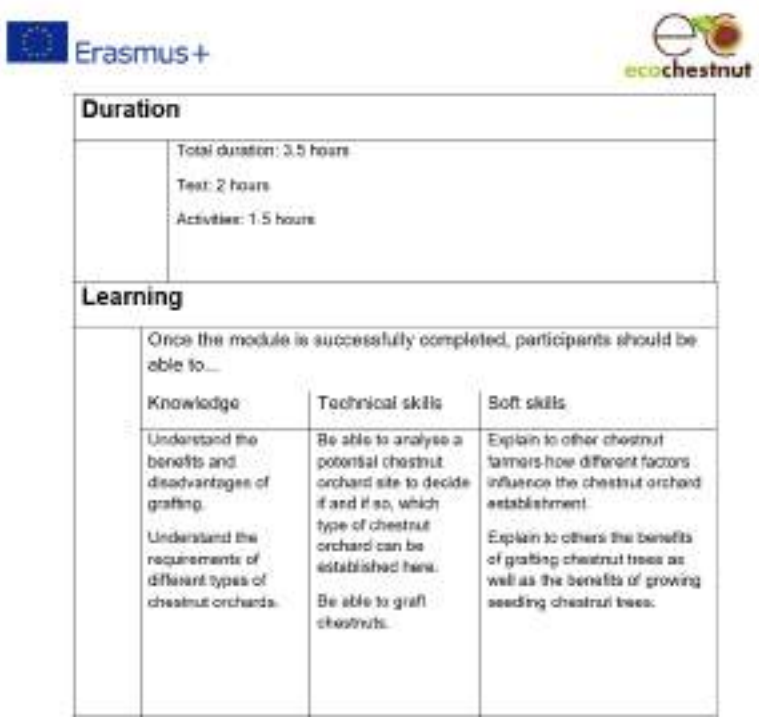
Ref : 2019-1-FR01-KA202-062276

ecological value, its relevance in wood production, as a source of energy that is maintained throughout the year, etc.

5.2. Competences and skills

For the European organic chestnut producers, the knowledge & competences that they must master are quite multi-folded. However, competences will be further completed according to the contents of the training course following a template on knowledge, technical and soft skills (**Figure 7**). This way, each partner will define the competences and skills for each part of the training course. Then, all of them will be collected and put together to form a complete list of competences and skills for the whole project. Some of the general competences are described below:

- To reopen and maintain the old chestnut (grafting).
- To develop new plantations with more productive varieties.
- To master some organic production techniques/treatments adapted to the new diseases.
- To strengthen the processing & innovate with new organic products (drying, vacuum, canned food, etc.).
- To better promote traditional products (liqueurs, jams, creams, chestnut flour, crystallized chestnut, etc.).
- To valorize the important natural & cultural heritage associated with the chestnut groves (landscapes, dry stone walls, ancient hydraulic systems, biodiversity, artisanal know-how linked with wood processing, etc.) through touristic activities.
- To transform the organic production to enhance their competitiveness and respond better to the growing market demand.



Duration	
	Total duration: 3.5 hours Test: 2 hours Activities: 1.5 hours

Learning			
	Once the module is successfully completed, participants should be able to...		
	Knowledge	Technical skills	Soft skills
	Understand the benefits and disadvantages of grafting. Understand the requirements of different types of chestnut orchards.	Be able to analyse a potential chestnut orchard site to decide if and if so, which type of chestnut orchard can be established here. Be able to graft chestnuts.	Explain to other chestnut farmers how different factors influence the chestnut orchard establishment. Explain to others the benefits of grafting chestnut trees as well as the benefits of growing seedling chestnut trees.

Figure 7. Template for competences and skills of the learning modules.

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Ref : 2019-1-FR01-KA202-062276

5.3. E-learning platform

Hence it is important to distinguish between the institutional or dissemination platform (webpage) and the project platform for trainees. The online sessions will be realized through the project platform ("or other online communication platform", as stated in the submission form). We must use high variety of resources, as much interactive as possible so gamification is recommended. All resources and content will be also available as .pdf files to be downloaded and used offline.

At this project, platform for trainees, a list of resources and learning tools as well as all the contents of the learning course will be put at trainees' disposal. The platform will combine traditional and virtual learning to try to reach the largest number of people regardless of their informatic skills considering that, at list, all the modules will have theorical content, useful resources for the lesson, case studies, activities, and a self-evaluation quiz. Despite it will be available to download all the theoretical material and other activities (test, study cases, support material), the course is designed to follow the instructions of the different modules for faster and more entertaining learning. One of the activities that will be promoted is the discussion of the study cases in forums, in which each person will be able to give their point of view (initially under the supervision of those responsible for the modules), greatly enriching the quantity and quality of the knowledge acquired. Moreover, for a better understanding of the theory, the possibility of recording virtual classes in the initial period of the project and uploading them to the platform is being considered. In this way, people who start the course years after uploading the content will continue to have the support of the creators of the module.

5.4. The online assessment

If you decide to work in complete autonomy, your effort will be validated by a Certificate of completion, automatically if you complete successfully all the self-evaluation questionnaires provided at the end of each Lessons (). If you are participating to a face-to-face training or to blended learning sessions, please ask your training entity/trainer for the Certification process.

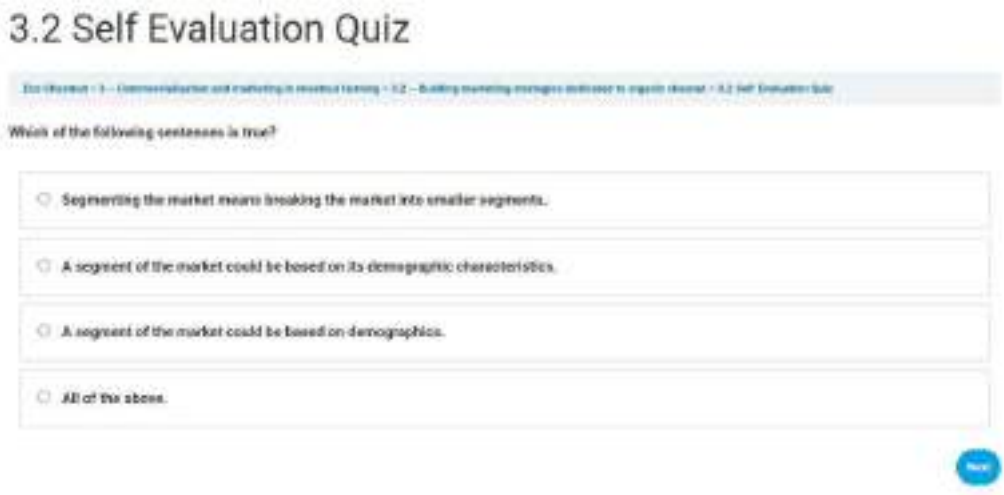

Figure 8. Overview of the self-evaluation quiz.

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Conclusions

Based on all studied target groups and their needs, the partners decided to develop a training course following B-learning, multidisciplinary and comprehensive approach to meet the specific needs for a course in organic chestnuts and chestnut products mainly targeted towards farmers and producers. The Learning Model described in this manuscript will help to provide transversal, multidisciplinary and tailor-made training and to develop an integral pack of training course, manual for trainers and guide on certification of organic chestnuts applicable on EU level. The course will be directed to everyone interested in this topic and will allow to improve the competitiveness of the chestnut producers and provide the possibility to explore a new niche for their business by applying traditional and eco-friendly methods for growing of the chestnuts and production of organic chestnut products and promoting them as part of the intangible legacy of their country. With the help of the Learning Model, the principles for the course development were set as follows: 1) a course unique for all target groups, countries and territories with slight modifications depending on the needs of each partner, 2) trainer will adapt contents depending on end-user needs according to the main three target groups, 3) the scope will be holistic, multidisciplinary and intersectoral, 4) didactic methodology will be practical, active, interactive, non-formal and co-created with trainees when possible and 5) the course will have a duration of 80-100 learning hours, combining self-studying with online sessions with a trainer and will be divided into 4 main sections (divided in 18 modules) and a fifth optional stage, this is, practicum (optional 20h). Therefore, the correctly establishing of the Learning Model and the pedagogical framework is essential to the successful development of the course and the implementation of this new training option for farmers in all Europe.

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ANEX I: Competences and skills of the course

1.1. Planting and grafting		
Soft skills	**Soft skills**	**Soft skills**
Understand the benefits and disadvantages of grafting. Understand the requirements of different types of chestnut orchards.	Be able to analyze a potential chestnut orchard site to decide if and if so, which type of chestnut orchard can be established here. Be able to graft chestnuts.	Explain to other chestnut farmers how different factors influence the chestnut orchard establishment. Explain to others the benefits of grafting chestnut trees as well as the benefits of growing seedling chestnut trees.

1.2. Fertilization and management of the agricultural soils		
Soft skills	**Soft skills**	**Soft skills**
The successful participant will: - Understand the principles of plant nutrition of higher plants and the essentiality of nutrients - Be able to recognize the need for fertilizer application - Interpret the results of tools used to diagnose soil fertility and tree nutritional status - Be able to recognize specific nutritional requirements of chestnut - Be able to implement a soil fertility management system for organic chestnut	The successful participant will: - Evaluate the nutritional balance of an agro-system and the potential need for fertiliser application - Interpret the results of soil testing and plant analysis - Prepare a fertilization program from the results of soil testing and plant analysis - List the priority actions to manage soil fertility in each crop and environment - Prepare a fertilization program for chestnut organically managed	The successful participant will develop: - Creativity, stimulated by the complexity of analysing biological systems - Persuasion, due to the scientific density of the module and the security it creates in the participant - Collaboration, through the perception of the interconnection between modules such as soil fertility and weed management - Adaptability, given diversity of tools for orchard nutrition management and different agro-ecological situations - Emotional intelligence, by applying the most environmentally friendly organic production method.

1.3. Trees pruning and conduction of the plant		
Soft skills	**Soft skills**	**Soft skills**
Define pruning need - The Shape of the tree - The right season and weather pruning conditions - The frequency of pruning - Issues of chestnut physiology - The nutritional status of the trees "	- Pruning techniques - Suitable tools - Use of pruning tools	- Ability to transfer theoretical knowledge to the application of methods of watering, pruning, processing

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Ref : 2019-1-FR01-KA202-062276

1.4. Irrigation of an organic chestnut plantation		
Soft skills	**Soft skills**	**Soft skills**
- Defining watering needs according to: - With the age of the tree. - the ground - Know the types of irrigation systems • Problems from watering	The use of irrigation systems - The selection of the appropriate system - Irrigation program	- Ability to transfer theoretical knowledge to the application of methods of watering, pruning, processing

1.5. From harvesting to storage		
Soft skills	**Soft skills**	**Soft skills**
- Know the main legislation applicable to organic chestnut production from harvest to storage. - Understand the factors that can affect the harvesting, transport and storage processes - Know when and how to harvest - Be able to recognize the advantages and disadvantages of the different types of harvesting and storage techniques - Be able to recognize specific precautions regarding transport Know the main packaging options and new trends	- Analysis skills of the potentiality of harvesting techniques - Awareness analysis of potential factors that could affect chestnuts during these processes - Evaluate the risks of bad manipulation of chestnuts during the supply chain - Prepare a transport and storage design for the successful production of chestnuts - List the priority actions to manage harvesting according to an organic production model	- Be able to transfer the theoretical knowledge on the chestnut harvesting, transport and storage - Creativity, stimulated by the complexity of analyzing complex chestnut supply chains - Collaboration, through the perception of the interconnection between modules - Adaptability, given the diversity of options for harvesting chestnuts and the requirements for chestnuts transport and storage - Emotional intelligence, by applying the most environmentally friendly organic production method

1.6. Methods of Products processing with organic certification		
Soft skills	**Soft skills**	**Soft skills**
- Knowledge of storage methods (industrial processing) - Knowledge of the products produced by the processing of chestnut - HEALTH EFFECTS: in humans	- Demonstration of storage methods - Analysis of products from chestnut processing	- Ability to transfer theoretical knowledge to the application of methods of watering, pruning, processing

2.1. Weed Management and Control		
Soft skills	**Soft skills**	**Soft skills**
The successful participant will: - Understand that “weeds” is an old concept that cannot mean they have always a negative effect in agricultural fields.	The successful participant will: - Evaluate when a weeding level is detrimental to the tree or beneficial to the agro-system - Establish threshold limits for acceptable levels of infestation	The successful participant will develop: - Creativity, stimulated by the complexity of analysing biological systems

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Ref : 2019-1-FR01-KA202-062276

- Be able to recognize the competitive effect of weeds but also their multiple benefits to the agro system. - Be able to select the ground management system most adequate for a given agro-environmental context. - Be able to understand what supplemental requirements a soil management system must meet to be used in organic farming.	- Construct a plan for weed control - Select methods of weed management - Perform in the right conditions the installation of a sown cover crop	- Persuasion, due to the scientific density of the module and the security it creates in the participant - Collaboration, through the perception of the interconnection between modules such as weed and soil fertility management - Adaptability, given the diversity of tools for weed management and the need to make options - Emotional intelligence, by applying the most environmentally friendly organic production method.

2.2. Protective measures against pests, parasites, and diseases		
Soft skills	**Soft skills**	**Soft skills**
- The impact of the major pathogens and pests on Europe's chestnut sector. - The interconnectivity between different pests and pathogens.	- Understand how to implement different soil management techniques to prevent chestnut ink disease. - Understand the biological control techniques of the chestnut gall wasp and chestnut blight.	- Transfer knowledge of the control of the major pathogens and pests to colleagues.

2.3. Biodynamic principles applied to disease prevention: prevention and fortification for cure		
Soft skills	**Soft skills**	**Soft skills**
- Understand the difference between organic and biodynamic practices - Understand the objective and purpose of biodynamics - Know prevention techniques of diseases and pests - Be able to recognize the advantages of the prevention and fortification - Know the main requirements for a healthy tree and the prevention of diseases	- Analysis skills of the potentiality and drawbacks of biodynamic agriculture - Apply specific plant care measures for the prevention of diseases - Evaluate the benefit of biodynamics applications. - Prepare a prevention program for the healthy growth of chestnut trees - List the priority actions to manage disease prevention	- Be able to transfer the theoretical knowledge on biodynamics and disease prevention - Collaboration, through the perception of the interconnection between modules - Adaptability, given the diversity of options and approaches for preventing and treating diseases - Emotional intelligence, by applying environmentally friendly method

3.1. Principles and tools for marketing in the organic sector		
Soft skills	**Soft skills**	**Soft skills**
- The main principles of 4Ps marketing - The main principles of 7Ps marketing - Main principles of labelling - About direct sales strategies	- How to apply the main principles of the 4Ps marketing mix - How to apply the extended 7Ps marketing mix - How to work and/or design their labels	- How to follow fundamental principles to overcome communication barriers. - Better online positioning via strategic marketing usage.

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		- To perform proactivity and marketing campaigns for sustainable positioning on the market.

3.2. Marketing approaches and strategy		
Soft skills	**Soft skills**	**Soft skills**
- Define basic marketing terms, necessary to know to apply marketing approaches and strategies. - Describe what is target group and targeted marketing and recognize their importance for fostering sales. - Define market share and underline its significance. - Be able to recognize a niche market. State what is brand marketing and why it is important.	- Construct a marketing strategy. - Perform various ways to introduce the new product to the market and generate sales. - Conduct a plan to increase market share. - Apply the learned information to successfully market organic & natural foods. - Demonstrate strategies to build a powerful brand.	- Adaptability - Intelligence to stand out from competitors. - Flexibility to adjust in the tough rules of the market. - Problem solving skills - Leadership - Open mindedness & creativity to - Willingness to learn the proper use of social media which is the modern way to market a product nowadays.

3.3. The essential elements and tools of digital marketing		
Soft skills	**Soft skills**	**Soft skills**
- For the main elements of the digital marketing - For the variety of digital marketing tools - How to prepare a digital marketing strategy for an organic products.	- Digital marketing skills in a cross-cultural and demanding environment; - Sales and Marketing skills - to enhance the collaboration via application of digital marketing tools.	- How to follow fundamental digital marketing principles to expand their market share. - Better online positioning via communication tools usage.

3.4. Essentials of today's marketing: Social media, Fairs and Networking		
Soft skills	**Soft skills**	**Soft skills**
- For the main elements of the social media marketing - ow to apply good practices for sales and networking; - How to prepare a social marketing strategy for an organic products/ chestnuts.	- Social media marketing skills in a cross-cultural and demanding environment; - Awareness & Skills for better networking; - Sales and Marketing skills - to enhance the collaboration via participation in events/fairs.	- How to follow fundamental social media marketing principles to promote their brand. - To perform proactivity for participation and sustainable positioning on various events & through networking activities.

3.5. Elements of economic analysis on the profitability of organic production		
Soft skills	**Soft skills**	**Soft skills**
- Understand the main limitations to profitable organic chestnut production. - Understand how organic chestnut production can be made profitable	- Be capable of implementing specific strategies on your farm to get higher prices for your organic chestnut(s) (products).	- Be capable of educating other chestnut farmers about how to make a chestnut farm profitable.

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Ref : 2019-1-FR01-KA202-062276

with the use of a few tricks and treatments. - Understand why organic agriculture and conventional agriculture have different profitability margins.	- Be able to use the canvas business model to design an economically profitable chestnut farm.	

4.1. Tangible and intangible heritage of European chestnut farming		
Soft skills	**Soft skills**	**Soft skills**
- Explain what Heritage is - Identify rural heritage - Outline local tangible and intangible heritage - Identify chestnut cultivation as part of cultural heritage - Identify chestnut tree as part of cultural heritage	- Identify their local heritage - Classify local tangible and intangible heritage - Select local heritage of chestnut cultivation that could be enhanced (tangible and intangible) - Identify potential social and economic benefits of the local heritage of chestnut cultivation	- Participate in various working groups and/or communities working on local rural heritage - Evaluate and review their own appreciation/opinion on local rural heritage - Share with non-specialists chestnut cultivation heritage

4.2. Organic chestnut farming and the tourist economy		
Soft skills	**Soft skills**	**Soft skills**
- Know about chestnut-based tourism activities - Identify links between local tourism and chestnut heritage - Know about sustainable tourism - Identify main tourism destination/attractivity in the region	- Identify existing tourism capacity linked with chestnuts groves and chestnuts production - Develop a strategy based on quality for new tourism activity - Develop network of stakeholders around tourism project	- Be willing to diversify their activity to cooperate with others to develop a tourism strategy, - To take part in a network of actors acting to create a tourism destination to evaluate and review their own initiatives

4.3. Environmental and landscape value of organic chestnut farming		
Soft skills	**Soft skills**	**Soft skills**
- Understand the concept of landscape. - Understand the impact of organic chestnut farmers on the environment and landscape preservation.	- Analyze the potential and impacts of your activity on the greater landscape and on local communities. - Be able to raise awareness about the landscape value of chestnut groves in your local area.	- Be able to transfer the theoretical knowledge on the chestnut grove and the greater landscape to other stakeholders.

4.4. Organic chestnut farming, a vector of social cohesion		
Soft skills	**Soft skills**	**Soft skills**
- Understand the concept of social cohesion and how the chestnut civilizations are a perfect example of this concept.	- Be able to give examples of European chestnut civilizations and how chestnut cultivation has had an impact on their sociocultural values. - Be able to explain how to rebuild social cohesion in former chestnut civilizations.	- Be able to teach the different actors of chestnut civilizations how their work / activities influence the social cohesion of the region.

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