

AgriSmart

Sustainability and digital skills for the agricultural sector



Co-funded by the
Erasmus+ Programme
of the European Union



AGRISMART MENTORS TOOLBOX

AUDIENCE OF THIS DOCUMENT

This Toolbox will be addressed to experienced practitioners, participations or aspiring in WBL-activities as mentors and will apply to various forms of WBL-training.

ACRONYMS AND DEFINITIONS

The complete “Glossary” is for each tool according to the learning units is provided in O2 output.



UNIVERSITÀ
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1. INTRODUCTION

AgriSmart is an Erasmus KA202 project that aims to adapt VET & WBL provision to existing and emerging occupational needs and strengthen farmers' climate-smart and digital skills. One of the outcomes of the project is the AgriSmart Toolkit, which deals with WBL needs and improvements in guiding and instructing work-based learning. This Toolbox is addressed to experienced practitioners, participating or aspiring in WBL-activities as mentors, and can support various forms of WBL-Training. These various forms can be: Dual VET Systems, Job Shadowing, Career Mentorship, Career Related Competitions, Informational Interviews, Paid Internships, Non-paid Internships, Practicum, Service Learning, and others.

During the mentorship, problems and challenges can emerge in the relationship between the mentor and the mentee. Misunderstanding and unclear explanations can lead to unsatisfactory results compared to expectations from both sides, leading to displeasure and frustration. By illustrating different examples and by proposing different training methods this unit shows how these challenges can arise and provide insights on how to solve them. This toolkit contains tools to improve teaching and training skills in general as well as in the topics covered by AgriSmart curriculum: Common Agricultural Policy (CAP), Sustainable Agriculture, Sustainable Water



1.1 WORK BASED LEARNING

Introduction	<p>What is WBL (Work Based Learning)</p> <p>Work-based learning (WBL) is the practice of exposing students to a real or simulated work environment with the intention of applying technical knowledge and skills learned in the classroom within a real-world setting. The goal of WBL is career preparation for the student; giving them the ability to put technical knowledge and skills into practice while also developing Career Ready Practices (sometimes referred to as “soft” or “employment” skills) necessary to be successful in the workplace.</p> <p>The learning concepts for learning in and at work as well as for learning via work all aim at action-orientation and self-direction of the learner. They are shaped very differently when implementing methodic and didactic approaches. In work-integrated forms of learning such as learning on the job and communities of practice, a primarily informal learning takes place in the absence of didactically structured learning organization.</p> <p>The paper at the following link provides an overview on models of WBL.</p> <p>https://www.researchgate.net/publication/312430805_Models_of_work-based_learning_examples_and_reflections</p> <p>The following link, published by GOVET, the Federal Government's Central Office for International Cooperation in Vocational Education and Training at BIBB, explicitly shows the advantages of the WBL.</p> <p>https://www.youtube.com/watch?v=Y-8jpaWtiyo&list=PLKk3TOS83jk_V34dKa4JtiAY9r14J9zZP&index=4</p> <p><i>(BiBB =Bundesinstitut für Berufsbildung/Federal Institute for Vocational Education and Training of Germany)</i></p>
VOOC	USE OF AGRISMART VOOC



	<p>The AgriSmart VOOC https://erasmusmoocs.thinkific.com/courses/agrismart-sustainability-and-digital-skills-for-the-agricultural-sector contains teaching materials on current agricultural topics that are considered useful by the agricultural labour market in Europe and beyond to be used for education and training purposes. The VOOC offers a very good starting point for putting theoretical knowledge into practice. In addition, the VOOC already provides goal-oriented links to practice-oriented learning. People who have been acting as mentors for years are recommended to engage with the VOOC. The VOOC offers future mentors a convenient opportunity to learn innovations in current agricultural topics in order to pass them on to mentees.</p>
<p>Mentors' role in WBL</p>	<p>ROLE OF THE MENTOR</p> <p>Since the Mentor is a person who works with young people, we must keep in mind that he must possess a number of competencies: from professional to pedagogical, and psychological in order to provide a mentee with a safe environment, full implementation of professional practice programs and constant support. The mentor is responsible for creating the internship program and must be in constant contact with the school and continuously monitor the development and improvement of the curriculum that requires its continuous improvement. The mentor is one of the most important links in the quality professional development of mentees and his profile is extremely important, both as an expert and as an educator.</p> <p>MENTORS' ROLE – MENTORING</p> <p>As a person who is in charge to lead and follow mentee in his practical work his role is also:</p> <ul style="list-style-type: none">➤ To give daily tasks and evaluations.➤ To motivate mentee in the process of learning.➤ To transfer professional experience to young mentees.➤ To transfer the sense for corporate values and traditions.➤ To inform school and parents about the mentee progress.



This is, that he/she has to be, not just expert in his/her profession but also an educator, psychologist and a good communicator. Since communication is a skill that can be learned and improved, mentors should always keep in mind the following characteristics of effective communication:

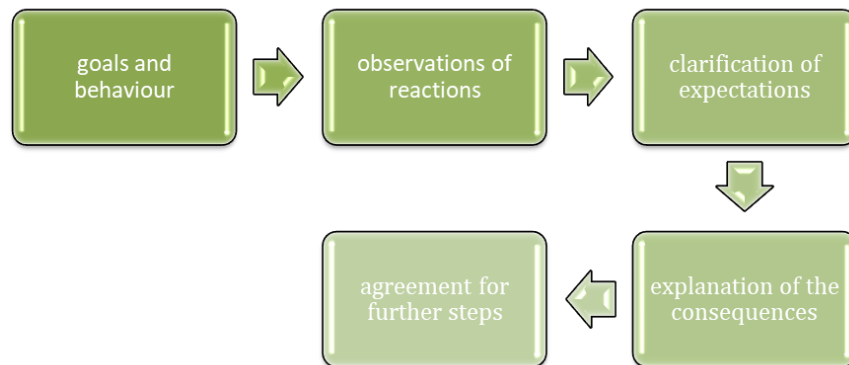
- Directness - face-to-face communication encourages dialogue and helps reduce potential problems that may arise in the coach-player relationship.
- Adaptability - communication should be specific to the mentee. In other words, appropriate to their age, abilities, prior knowledge, etc.
- Diversity - in addition to verbal communication, use non-verbal (body language should support the message).
- Exhaustiveness - What, Why and How - the mentee should know what to do, why and when and how to do the activity correctly (task)
- Simplicity and comprehensibility - the message should be conveyed in an understandable way using terms that the mentees understand.
- Individualization - the mentor must get to know each individual mentee in order to find the individual's best way to communicate with the individual and achieve the maximum from him.
- Honesty and Positivity - speech should be positive, stimulating in order to have a beneficial effect on the mentee. Honest to correct mistakes and build trust.

We have to keep in mind that communication is a two-way process and requires mutual understanding and mutual respect.

HOW TO GIVE FEEDBACK?

Feedback to a mentee should not be aimed only to warning or criticizing - its purpose is to instruct the mentee how he works, how he did a task/job and how to do it better and more efficiently.

Steps in giving feedback:



The main points in giving feedback are:

When giving the positive feedback – do it in front of others.

When giving the negative feedback - give it to mentee face to face without public. Always start with the good elements and finish with advice how to change.

Possible problems when the mentor has to give negative feedback can be:

- The mentee is late.
- The mentee did not finish task on time.
- The mentee is not polite with his mentor or other employees.

MENTOR ROLE – EXPERT, PROFESSIONALIST

As an expert in his profession, who is also an educator, mentor has to continuously:

- work on self-improvement and self-development for the purpose of further professional and career development by life-long learning activities
- regularly monitor and follow new technological achievements of their profession
- regular monitoring and follow legal regulations related to safety at work
- be trained regularly as an educator and a person working with young people
- improve the methodology of work as a mentor
- improve communicational skills.

The mentor in his work with mentee has opportunity to transfer all his knowledge and skills, enthusiasm, attitude and motivation for profession and work to mentee.

With his knowledge, engagement and development of a positive and encouraging relationship with mentees, very often the mentor becomes a role model for his mentee. It is an exceptional role for every mentor, but it is also a great responsibility that must be made real.



As a person who works in a company and has an important role in education of the new co-workers, mentor has to have a set of different competencies.

- Professional area specific competencies
- Training related competences
- General competences

1. PROFESSIONAL AREA SPECIFIC COMPETENCIES

- high level expertise in the sector
- high level of professional knowledge and skills
- awareness of the company's activities and working methods
- awareness of the skills required for the profession
- awareness of the latest technological development in the labour sector

1.1. TRAINING RELATED COMPETENCES

Mentors should:

- have high competence in their professional field
- have a high motivation to train and transfer their knowledge and skills
- be flexible, creative and adaptive at assigning tasks to mentee
- know the curricula, and training objectives
- be communicative, used to work in a team and manage working process
- use different approach to every mentee, depending to their opportunities and foreknowledge
- be ready for life-long learning and professional development

1.2. GENERAL COMPETENCIES

General, shared, trans-disciplinary competences.

- Those are all competencies that are not directly related to the field of study and profession.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> ability to plan and manage time	<input type="checkbox"/> leadership ability	<input type="checkbox"/> Ethical attitude
<input type="checkbox"/> ability to solve problems	<input type="checkbox"/> ability to work in a team	<input type="checkbox"/> communication skills
<input type="checkbox"/> ability to make decisions	<input type="checkbox"/> elementary computer skills	<input type="checkbox"/> positive attitude
<input type="checkbox"/> project management	<input type="checkbox"/> information management skills	<input type="checkbox"/> ability to critique and self-criticize
<input type="checkbox"/> concern for quality	<input type="checkbox"/> ability to create new ideas (creativity)	<input type="checkbox"/> presentation skills
<input type="checkbox"/> ability to analyze and synthesize	<input type="checkbox"/> ability to adapt to new situations	<input type="checkbox"/> interpersonal skills



CASE EXAMPLES

Vocational education and trainings of a high quality are the milestone of any country's welfare.

These include:

- input - equipment available at the training venue, training plans and qualification of the mentor
- process –learning methods, motivation of mentors
- output –successful learning, final marks
- outcomes – transfer of what has been learned, utilization of the qualification

The following examples present well-established training methods in WBL that are deemed particularly valuable for the Agrismart curriculum.

Case example 1: 4-step-method

Description:

This method is one of the mostly used and based on the 4 steps:

- Preparation
- Presentation
- Application
- Evaluation

1)Theoretical explanation

For most types of tasks, it makes sense to first instruct the mentee theoretically in the new area. Imagine having to learn a musical instrument. Before you go wild, you should at least know what the individual notes mean and how they are put together to form a coherent piece of music.

So, first, familiarize your mentees with their new area of responsibility.

Explain the task from a "bird's eye view". This means that you make understand the importance of the work in the overall structure of your company. For example, you can explain your mentee that by filling out forms the mentee is doing some important groundwork so that the company can do business with large customers.

Case
examples

Teaching
methods



This will lead to the mentees being able to better understand the meaning of their work and thus also developing a sense of responsibility for it.

2) Practical demonstration

Before you allow your mentees to tackle the tasks on their own, you should first demonstrate the correct workflow. The aim is for the mentees to be able to imitate desirable behavior patterns from you to be able to work quickly and efficiently on their own later. For particularly important tasks, you can also document the individual work steps in writing. In this way, your mentees can always refresh their knowledge of the course, of a task - without you having to stand by them every time.

During your practical instruction, make sure that you reduce your pace a little - after all, your mentees should also be able to understand how they should work in the future. If you go too fast, he will have trouble processing the new information. It is best to always ask interim questions to check whether your mentee can mentally follow you.

3) Theory and practical test

Have you conveyed the theory to your mentees and clearly documented the individual work steps? Then it's time for a theory and practice test. Give your mentees their own task and monitor their work process. With specific questions and variations of the task, you can check whether he already has the necessary technical and practical maturity to be left with new tasks independently. After the test phase, you should send your mentees detailed feedback. Rule of thumb: It is better to be a bit "picky" instead of letting too much "get away". Routines in the workflow solidify quickly and are difficult to change again. So, make sure that your mentees' approach to tackling the tasks assigned to him is as effective and efficient as possible from the start.

4) Independent practice phase

How well a mentee copes with its tasks, will show only when it responsibly his work goes. Here, too, the four-step method provides that you give your mentee regular feedback and partially monitor their performance. The aim is that you must improve less and less over time and thus increase the feedback intervals. The mentor gives the instructions. This method is useful to work out learning targets in the psychomotor field, especially basic skills.

Advantage:



This method is time saving, purposeful, and through step-by-step-instruction logical.

Disadvantage:

The 4-step-method is related to the mentor and let less free space by the training. During the instruction of a new work process, there are always stoppages, misunderstandings, and blockages on the part of mentor or the mentee.

5) Case:

By using the 4-step-method, the mentor instructs the mentee in a new task. He should mill-cut a small area of arable land and prepare it for sowing the lawn. After the instruction into machines function and the instructions for implementation, the mentee begins the work. After completing the work, the result is unfortunately not satisfactory. The milled surface does not meet the expected standard. The machine has not been cleaned and serviced. The mentor is disappointed because what has been instructed has not been adequately implemented. The mentee is disappointed because he did not understand the task correctly. The mentee says that if the instruction had been better, the result would have been better.

Method of resolution:

- Feedback discussion
- Target agreements

The most important question from mentor to mentee: "Have you ever done this task before?"

Tips for practice

- The four-step method is a learning method that can be used excellently in almost all areas where people are exposed to new tasks.
- The system reads very well and effectively on paper - in fact it is.
- Effectiveness ultimately means that the basic approach is correct (intensive training, detailed demonstration, regular feedback, etc.).
- However, this can quickly affect efficiency.
- The four-step model is an approach that takes a long time to start.



- As a result, you should only use this method when it comes to very significant tasks in your company that need to be done over the long term.
- The introduction is often too time-consuming for short-term or rarely occurring tasks.
- In such a case, you should delete the first phase completely or at least treat it much more briefly.

Evaluation:

Useful for mentees and mentors are evaluation sheets. The advantage is, the mentor has an overview about before and after an instruction and about the learning development.

Case example 2: Guiding-text-method

Guiding texts are written instructions for learning. The mentees will guide via questions and tasks to independent searching for information, work materials, sources and media. This method is used to develop professional independence and action competence. The mentees plan their learning process and the contents mostly independent. In usual they work together in a group about 3-5 mentees and begin a learning or work process. Afterwards a practical implementation is following.

For mentors is this method connected with a high work effort, because all information must be matched to the mentees requirements.

For mentees this method requests a high degree on initiative of one's own and independence.

This method trains social, specific and method competences.

Advantage:

The mentee learns during the guiding-text-method usage, how work steps be planed and structured. Also, he learns new kinds of activity. Independent acting will be supported as also required.

Disadvantage:

This method makes sense for higher classes, because the need a little basic knowledge. If mentees don't have and mistakes follow, the mentees will be quickly demotivated.



Conflict situation:

Using the example of the Guiding-Text-Method, a learner is instructed in how a brush cutter works. First, the instructor explains how the model works and then explains components and maintenance options on the real device. In addition, the personal safety instructions are explained. Additional different mowing techniques. Then the mentee begins to understand and memorize this theoretical knowledge based on guiding texts, until the practical exercise takes place. It turns out that the flood of information in the theoretical area was far too much for the mentee and that he/she cannot remember all the instructions and teachings. The guiding texts have all been drawn up and completed correctly and satisfactorily. The practical implementation is unfortunately not so satisfactory because a large part of the information was not considered because it was forgotten.

Possible sources of mistakes:

- The mentee has difficulties with the guiding texts because the basic school education is too weak.
- The information is too intense, not detailed enough and the mentor uses too many foreign words. The consequence may be that the mentee eventually shuts.
- The mentee has a migrant background and understands practical instructions better, if the mentor prefer other instruction methods.

Case example 3: Digital media

Digital media “Whether computer, smartphone, tablet or virtual reality glasses - there are many possible uses for digital media in vocational training. But not only learning with digital media is important, it is just as important to understand the media itself as an object of learning to be able to use them responsibly. In this context, comprehensive media competence is a basic requirement for teaching staff and for the learners themselves. Digital media provide the bridge with which the close interrelationship between training, knowledge-intensive specialist work and advancing technological development can be brought into context. They support learning processes in complex, continuously changing work environments, which in turn are largely shaped by IT technology. They can be used for self-controlled information acquisition, support communication and the direct exchange of experiences, enable immediately required specialist knowledge about network-based access to information and thus accompany learning in the work process. These diverse possibilities also bring new challenges for the educational



staff. Which, on the one hand, lie in staying up to date themselves, and on the other hand in selecting, designing, and accompanying meaningful opportunities for the training and the mentees. In the context outlined above, digital media are explicitly to be understood as part of a comprehensive education and management concept. Today, mentees, educational staff and trained specialists can interact with each other on the move, electronic portfolios are able to continuously document training courses, professional career paths and competence developments. Using jointly granted access rights to their electronic report books, for example, mentees can plan, accompany, and control the course of their training together with company and vocational school staff and specifically promote individual company career paths. Knowledge from experience can be exchanged and documented in real time.

Advantages:

- Fast and direct collaboration throughout the learning group.
- Cautious learners have an easier time getting involved in learning group.
 - individual progress can be better controlled.
- Digital learning offers many different areas of application, so that the learning content is not limited to just one subject.
- Learning together should make the learning experience easier for children.
- Interactive learning experiences are intended to improve motivation.
- The curriculum is much more based on the realities of life of the students since the internet has become an integral part of everyday life.

Disadvantages:

- Familiarization with the use of digital media requires a lot of time, which is missing for teaching.
- Most teachers are not (yet) tech-savvy enough that extensive training is necessary.
- Technical disruptions affect a smooth lesson.
- Equipping a digital classroom costs a lot of money (the budget is usually cut in other unsuitable places).



	<p>➤ Language is no longer a compulsory tool for participation in class, so that communication skills can decrease.</p> <p>➤ Depending on the application, the actual subject teaching takes a back seat.</p> <p>Conflict situation:</p> <p>The more learners take part in an e-learning course at the same time, the more difficult it becomes to contact the participants, answer questions, moderate discussions, and offer feedback on learner achievements. In principle, it can be assumed that if the structures are well prepared, the learners can also perform these tasks independently. However, the potential that lies in working with fellow learners is sometimes not realized, partly because in traditional teaching we are used to focusing our attention on the "omniscient" teacher.</p> <p>Lack of contact with mentors</p> <p>Another problem: young people now have to study at home without a teacher/mentor being available to answer questions or provide feedback on tasks that have been completed. The greatest difficulty with e-learning is this lack of direct and personal contact. This leads to misunderstandings more quickly, which at the same time are less often resolved. It is therefore imperative to apply what you have learned directly in exercises. This is the only way to achieve learning success that can also be checked.</p> <p>It is important that the mentees do not feel left alone.</p> <p>Digital learning platforms offer interactive learning videos and exercises in which various topics are explained according to different age groups in the form of a story. Afterwards, what you see can be implemented directly in an exercise to internalize what you have learned.</p> <p>Method of resolution:</p> <ul style="list-style-type: none"> • Make sure, that the mentee never feels alone with his problems. • Offering homework chats • Target agreements • Evaluation
<p>Additional resources from other</p>	<p>ADDITIONAL RESOURCES</p>



<p>courses/video s/tutorials on the topics</p>	<p>Action-oriented-vocational-training:</p> <p>https://www.bing.com/videos/search?q=Action-oriented-vocational+training+steps&docid=603509756282098293&mid=A37E083F8D982156B392A37E083F8D982156B392&view=detail&FORM=VIRE</p> <p>Upgrading mentors in dual-vet systems:</p> <p>https://upt2sproject.com/</p>
<p>Assessment</p>	<p>ASSESSMENT</p> <p>How to assess?</p> <p>It's very important for the trainer to assess the trainee, according to the requirements set by National or regional Educational Governments (All of this is depending on each country)</p>



Assessment Overview



Example for mentors to assess their mentees:

Professional behavior	++	+	+/-	-	-	Observations/feedback
Investment in work, motivation						
Understanding and respect Instructions given						
Speed and thoroughness of execution of work						
Ability to organize job						



	Ability to take initiatives						
	Ability to deal with unforeseen, autonomy						
	Communication skills, discussion, feedback and solution proposals						
	Reactions to criticism						
<p>Nowadays the assessment is done by a digital way for example assessment apps.</p> <p>It also can be the case that the quality of the mentoring can be assessed:</p> <p>Instructor effectiveness</p>							
	1. Mastery of the subject					Not knowledgeable	Knowledgeable
	2. Ability to transfer/communicate information and knowledge effectively					Very poor	Excellent
	3. Ability to arouse and sustain interest					Very poor	Excellent
	4. Openness to ideas of trainees					Not receptive	Receptive
	5. Encourage of trainee participation					Did not encourage	Encouraged
	6. Time management					Very poor	Excellent



	7. Speed in talking	Too slow	Too fast
	8. Clarity in speech	Not clear	Clear
Practical teaching activity (e.g. Workshop/Focus group)	Case example student is mentally/ physically overload.		
	<p>The following link shows you a video about a mentee who is physically and mentally overload due to the instructions by his mentor and a solution for a smart introduction.</p> <p>https://clipchamp.com/watch/Wuozi8EaMce</p>		

1.2 COMMON AGRICULTURAL POLICY (CAP)

LU1: COMMON AGRICULTURAL POLICY (CAP)	
Abstract	<p>This learning unit focuses on a general overview of the CAP, its benefits for farmers and EU citizens, and introducing new strategies proposed by the EU Commission for the future of the new Common Agricultural Policy, which will be implemented from 1 January 2023.</p> <p>The objective of this unit is to familiarise the farmers with the overall aspects of the new CAP policies, focusing on issues related to climate change, biodiversity loss and management of natural resources.</p> <p>Furthermore, another objective is presenting the novelties of the new CAP, which were introduced in response to criticism from previous</p>



	periods- the new CAP will also ensure a fairer distribution of CAP support, especially to small and medium-sized family farms and young farmers.				
Connection with another LU or Output materials	This LU represents a legislative background for all other learning units, mainly in terms of environmental protection and sustainability, the efficiency of food production, support of innovations in the agricultural sector, and supporting rural community development in general. To deepen the content, see O2 T2 Document or VOOC.				
Forms and methods for teaching	<ul style="list-style-type: none"> ➤ e-learning courses ➤ action oriented learning forms ➤ Farm education – experience agriculture up close ➤ Non-formal, informal education ➤ 4-Step-Method ➤ Guiding-Text-Method 				
Structure and additional learning methods of the LU (suggested)	Topic	Hours	Theory	Practice	Additional
	THE BENEFITS OF THE CAP	8	X		Focus group
	THE NEW CAP	16	X		Expert seminar, focus group
	CAP REFORM AND THE NEW MODEL OF AGRICULTURE AND	16	X		Expert seminar, focus group



	SUSTAINABILIT Y				
Additional resources from other courses/videos/Apps/tutorials on the topics	<p>Reforming the Common Agricultural Policy: https://www.youtube.com/watch?v=tcQTN6CGpQw</p> <p>Timeline: The Common Agricultural Policy: https://www.youtube.com/watch?v=Z3tUtTMIXuA</p> <p>Unpacking the CAP: exploring the most common concerns: The German ministry of agriculture (BML), Germany provides the CAP Strategy plan. https://www.bmel.de/EN/topics/farming/eu-agricultural-policy-and-support/eu-agricultural-policy-and-support_node.html</p>				
Practical exercise (e.g. PDF/Video tutorial/Apps)	https://www.youtube.com/watch?v=f7GJDfWBizg				
Practical teaching activity (e.g. Workshop/Focus group)	<p>The O1 and O2 did not specify a practical activity for that LU; however, focus group discussion during lessons for developing a critical and innovative vision about future policy is recommended. It could be helpful, for example, to simulate the participation or get involved in activities promoted by the European Commission, such as: "Call for expression of interest for experts participating in Focus Groups of the European Innovation Partnership on 'Agricultural Productivity and Sustainability'"</p> <p>https://ec.europa.eu/eip/agriculture/sites/default/files/20211123_calltext_fg44-46_final.pdf</p>				



	Furthermore, seminars and interviews with professionals working on the topic for the EU research center on the territory or other experts linked to the topic are recommended.
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1.3 SUSTAINABLE AGRICULTURE

LU 2: SUSTAINABLE AGRICULTURE	
Abstract	The European Union and the United Nations have set targets for protecting soil, water, air, climate, and biodiversity. Agriculture plays a central role in achieving the goals, as it is one of the most critical land users. Sustainable agriculture could contribute to achieve environmental goals. It would even benefit from it because it depends on fertile soils, reliable climatic conditions and a high level of biodiversity. This unit explains the learner what is necessary for agriculture to become part of sustainable development?
Connection with another LU or Output materials	This teaching unit deals with the general structures of sustainable agriculture and refers to further information when working through the chapters. LU 1 refers to legislative structures (CAP and the new model of agriculture and sustainability), LU 3 to the sustainable use of water resources, LU 4 to sustainable crop protection, and LU 5 shows the achievement of sustainability through digital application methods LU6 points to the handling of data.
Forms and methods for teaching	<ul style="list-style-type: none"> ➤ e-learning courses ➤ action oriented learning forms ➤ Farm education – experience agriculture up close ➤ Non-formal, informal education ➤ 4-Step-Method ➤ Guiding-Text-Method



	Topic	Hours	Theory	Practice	Additional
Structure and additional learning methods of the LU	SUSTAINABLE AGRICULTURE PRINCIPLES	2	X		Expert seminar
	SUSTAINABLE AGRICULTURE METHODS	4	X		Focus group
	SUSTAINABLE AGRICULTURE GOALS	4	x		
Additional resources from other courses/videos/Apps/tutorials on the topics	<p>➤ FAO of the United Nations: https://sustainability</p> <p>Organic farming in Europe https://www.youtube.com/watch?v=0IJX1rCgSYg</p> <p>Sustainable agriculture publication https://www.researchgate.net/profile/John-Reganold/publication/260785326_Sustainable_Agriculture/links/548fae360cf2d1800d86298f/Sustainable-Agriculture.pdf</p>				
Practical exercise (e.g. PDF/Apps/Video tutorial)	<p>https://www.unep.org/news-and-stories/story/beginners-guide-sustainable-farming</p> <p>https://www.youtube.com/watch?v=iloAQmroRK0&t=54s</p> <p>https://www.youtube.com/watch?v=Yx0lZvYhWtw</p>				
Practical teaching activity (e.g.	The O1 and O2 did not specify a practical activity for that LU; however, focus group discussion during lessons for developing a critical and				



Workshop/Focus group)	<p>innovative vision of Sustainable Agriculture is recommended. It could be helpful to simulate the participation or get involved in activities promoted by the European Commission, such as: "Call for expression of interest for experts participating in Focus Groups of the European Innovation Partnership on 'Agricultural Productivity and Sustainability'"</p> <p>https://ec.europa.eu/eip/agriculture/sites/default/files/20211123_calltext_fg44-46_final.pdf</p> <p>Furthermore, seminars and interviews with professionals working on the topic for the EU research center on the territory or other experts linked to the topic are recommended.</p> <p>https://eos.com/blog/sustainable-agriculture/</p>
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1.4 SUSTAINABLE WATER USE MANAGEMENT

LU 3: SUSTAINABLE WATER USE MANAGEMENT	
Abstract	<p>This teaching unit focuses on water as the main factor determining the growth and development of plants, determining the effects of plant and animal production. It concerns water management plans and drought prevention, which must consider the multifunctional role of agriculture and its importance for landscape services. It raises the need to limit the agricultural production method, characterised by high water consumption on the one hand and water pollution on the other, and the cheapest way to reduce water stress on agricultural land is by introducing good cultivation practices.</p>



	<p>Aims of the course: familiarising farmers with the concept of melioration as the basis for improving the efficiency of farmland management, getting acquainted with precise irrigation that saves water, what role can farmers play in solving the problem of drought, how to store water for agricultural purposes, informing farmers about the need to stop water evaporation by introducing trees and other solutions that keep water in the landscape, showing that the maintenance of grassland and permanent vegetation (trees and shrubs) along watercourses also contributes to the growth of biodiversity, showing how excess water in agricultural areas increases the risk of the outflow of nutrients, familiarisation with the problem of high water consumption characterising the entire production chain in industrial farming, which poses a severe risk of water scarcity, both for the needs of this sector and for other sectors of agricultural production.</p> <p>An additional goal of the course is to conduct a practical exercise that will test the acquired knowledge on, among others, how you can not only drastically reduce water consumption and costs but also increase yield and quality compared to unsustainable irrigation.</p> <p>The introductory questionnaire will test the baseline knowledge and provide a range of theoretical and practical lessons.</p>
<p>Connection with another LU or Output materials</p>	<p>In general: LU 3 can be connected with lectures about agronomy, sustainable agricultural practices (e.g., livestock production, organic farming), technological innovation, and EU common policy.</p> <p>Concerning AgriSmart: LU3 should be conducted after LU 2 because the theory and the practical activities are interlinked. LU3 would also benefit from the other LUs, but this is not a strict requirement.</p>



<p>Forms and methods for teaching</p>	<ul style="list-style-type: none"> ➤ e-learning courses ➤ action oriented learning forms ➤ Farm education – experience agriculture up close ➤ Non-formal, informal education ➤ 4-Step-Method ➤ Guiding-Text-Method 				
<p>Structure and additional learning methods of the LU</p>	<p>Topic</p>	<p>Hours</p>	<p>Theory</p>	<p>Practice</p>	<p>Additional</p>
	<p>INTRODUCTION</p>	<p>3</p>	<p>X</p>		
	<p>WATER IN AGRICULTURE</p>	<p>3</p>	<p>X</p>		
	<p>NATURAL RETENTION</p>	<p>6</p>	<p>X</p>		
	<p>WATER MELIORATION</p>	<p>6</p>	<p>X</p>		
	<p>IRRIGATION</p>	<p>6</p>	<p>X</p>	<p>X</p>	
	<p>LIVESTOCK PRODUCTION</p>	<p>10</p>	<p>X</p>	<p>X</p>	<p>Expert seminar</p>
	<p>PROTECTION OF WATER RESOURCHES</p>	<p>8</p>	<p>X</p>	<p>X</p>	<p>Expert seminar</p>
	<p>GOOD PRACTICES</p>	<p>3</p>	<p>X</p>	<p>X</p>	<p>Field visit in a good practice study farm</p>



<p>Practical teaching activity (e.g. Workshop/Focus group)</p>	<p>The O1 and O2 did not specify a practical activity for that LU; however, focus group discussion during lessons for developing a critical and innovative vision about sustainable water use is recommended. It could be helpful to simulate the participation or get involved in activities promoted by the European Commission, such as: "Call for expression of interest for experts participating in Focus Groups of the European Innovation Partnership on 'Agricultural Productivity and Sustainability'" Theme: 46 Water: Nature-Based Solutions for water management under climate change: https://ec.europa.eu/eip/agriculture/sites/default/files/20211123_calltext_fg44-46_final.pdf</p> <p>It is also suggested that a field visit at least on a farm with crops and livestock productions is considered the best-case study for LU purposes, and seminars/interviews with professionals'/expert farmers are recommended.</p>
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1.5 SUSTAINABLE PEST AND WEED MANAGEMENT

<p>LU: 4 SUSTAINABLE PEST AND WEED MANAGEMENT</p>	
<p>Abstract</p>	<p>EU rules on the sustainable use of pesticides aim to protect human health and the environment from the potential risks and effects. These rules promote the reduction of pesticides by integrated pest management and alternatives to chemical pesticides.</p> <p>Sustainable weed control: Weed control is an essential element of successful crop production. The development of herbicide resistance in a large number of weed species around the world has exacerbated weed infestations. These circumstances require sustainable weed control tools that can be used effectively to achieve adequate crop yields without negatively impacting the environment and ecosystem</p>



	<p>services. Some of the conventional weed control methods, including the application of preventive measures, tillage and mechanical control, plant competition, land cover, crop rotation, and crop diversification, are still effective and environmentally friendly. Recent advances in renewable energy, remote sensing, modeling, automation, and robotics have opened new windows for more physical weed control methods such as thermal weed control, precision weed control, and crop weed seed control.</p> <p>Sustainable pest control:</p> <p>Instead of killing harmful organisms directly, their normal biological and physiological behavior is prevented and controlled using certain techniques. Biological control is the intervention of harmful organisms in the natural life process with the help of certain techniques. In order to stop or reduce the damage caused by insect pests, the procedures that keep them below the level of economic damage with the help of their natural enemies are called biological control.</p> <p>In other words, in order to remove the harmful organism from the environment or lower it below a certain level, another living being must be brought into the environment by eating the existing living being and/or laying its egg in the pest in order to reproduce itself. Important biological control agents are traps (pheromone traps, light traps, visual sticky traps, water traps and food traps), attractants or repellents, chemicals and hormones that interrupt the growth of insects.</p>
Connection with another LU or Output materials	This teaching unit deals with the general structures of sustainable pest and weed management and refers to further information when working through the chapters. LU1 refers to legislative structures (CAP and the new model of agriculture and sustainability), LU5 shows



	the achievement of sustainability through digital application methods and LU6 points to data handling.				
Forms and methods for teaching	<ul style="list-style-type: none"> ➤ e-learning courses (for theoretical lessons) ➤ action oriented learning forms ➤ Farm education – experience agriculture up close ➤ Non-formal, informal education ➤ 4-Step-Method ➤ Guiding-Text-Method 				
Structure and additional learning methods of the LU	Topic	Hours	Theory	Practice	Additional
	WHAT IS SUSTAINABLE WEED MANAGEMENT	2	X		
	METHODS OF SUSTAINABLE WEED MANAGEMENT	8	X		Field visit in a best-case study farm
	WHAT IS SUSTAINABLE PEST MANAGEMENT	2	X		Expert seminar



	METHODS OF SUSTAINABLE PEST MANAGEMENT	8	X		Field visit in a best-case study farm
Additional resources from other courses/videos/Apps/tutorials on the topics	Explanatory video Mechanical weed control, hoeing https://youtu.be/ffr8iDicY9I				
Practical exercise (e.g. PDF/Apps/Video tutorial)	Eco Friendly Pest Control Alternatives that Work https://www.ecofriendlyincome.com/blog/eco-friendly-pest-control Literature Drone and sensor technology for sustainable weed management: a review Chemical and Biological Technologies in Agriculture Full Text (springeropen.com)				
Practical teaching activity (e.g. Workshop/Focus group)	The O1 and O2 did not specify a practical activity for that LU; however, focus group discussion during lessons for developing a critical and innovative vision about sustainable pest and weed management. It could be helpful to simulate the participation or get involved in activities promoted by the European Commission, such as: "Call for expression of interest for experts participating in Focus				



	<p>Groups of the European Innovation Partnership on 'Agricultural Productivity and Sustainability"</p> <p>Theme: 44: Sustainable ways to reduce the use of pesticides in pome and stone fruit production</p> <p>https://ec.europa.eu/eip/agriculture/sites/default/files/20211123_cailtext_fg44-46_final.pdf</p> <p>It is also suggested that a field visit at least on a farm with crops and livestock production considered the best case study for LU purposes, and seminars/interviews with professionals'/expert farmers are recommended.</p>
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1.6 AGRICULTURE 4.0

LU 5: AGRICULTURE 4.0

Abstract	<p>This learning unit focuses on:</p> <p>The definition of Agriculture 4.0 and the phases that paved the way to modern agricultural production; the definition of precision agriculture and smart farming. The other main topics refer to the description of Digital technologies used in agricultural production, such as sensors, soil sensing technologies, crop sensing technologies, environmental sensors, agricultural machinery, and sensors for livestock.</p> <p>The LU will present a wide range of ICT applications and sensor tools in practice. The knowledge requirements of current farm managers are also oriented in this area. Researchers and mentors need to master existing solutions in the market and use professional tools to provide a scientific view of the issue- education and training courses must take these facts into account.</p>
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<p>Connection with another LU or Output materials</p>	<p>In general: connection with lectures about agronomy, agricultural activities (e.g. livestock production, organic farming), technological innovation, and EU common policy.</p> <p>In particular: LU is strictly connected to the next learning unit (LU 6), whereas the following module specifies the use and exploitation of data within Agriculture 4.0.</p>				
<p>Forms and methods for teaching</p>	<ul style="list-style-type: none"> ➤ Field days ➤ Farming simulator 				
<p>Structure and additional learning methods of the LU</p>	<p>Topic</p>	<p>Hours</p>	<p>Theory</p>	<p>Practice</p>	<p>Additional</p>
	<p>WHAT IS AGRICULTURE 4.0?</p>	<p>16</p>	<p>X</p>		
	<p>DIGITAL TECHNOLOGIES IN AGRICULTURE (INCLUDING SENSORS AND SENSING TECHNOLOGIES)</p>	<p>40</p>	<p>X</p>		<p>Field visits, good practice examples of successful enterprises, practical workshops</p>
<p>Additional resources from other courses/videos/Apps/tutorials on the topics</p>	<p>The Future of Farming</p> <p>https://www.youtube.com/watch?v=Qmla9NLFbVU&t=3s</p>				



	<p>What is Precision Agriculture? What is the meaning of Precision Farming?</p> <p>https://www.youtube.com/watch?v=WhAfZhFxHTs</p> <p>What is IoT, and what does it mean for farmers?</p> <p>https://www.youtube.com/watch?v=pOLAIVUs9S8</p> <p>Moisture Sensing for Smart Agriculture</p> <p>https://www.youtube.com/watch?v=hb6my_5eiOU</p>
<p>Practical teaching activity (e.g. Workshop/Focus group)</p>	<p>It could be helpful to simulate the participation or get involved in activities promoted by the European Commission, such as: "Call for expression of interest for experts participating in Focus Groups of the European Innovation Partnership on 'Agricultural Productivity and Sustainability"</p> <p>Theme: 45: Digital tools for sustainable nutrient management</p> <p>https://ec.europa.eu/eip/agriculture/sites/default/files/20211123_calltext_fg44-46_final.pdf</p> <p>Also are important field visits at good practice examples of successful agricultural enterprises and develop practical workshops.</p> <p>Furthermore, seminars and-or interviews with professionals and-or farmers developing devices, tools, and start-ups linked to the territory are recommended.</p>

1.7 DATA FOR SUSTAINABLE PRODUCTION



LU 6: DATA FOR SUSTAINABLE PRODUCTION

Abstract

This learning unit focuses on data, including its sources, use and legal aspects. Practical aspects related to data such as collection, analysis and practical use for companies are also strongly recommended and considered. The objectives of the course are: to bring farmers closer to data concepts and their use in farm-related services; the quality of the data, their origin and data exchange; teaching about managing data and finding new data; attention to legal and data security aspects; how to collect data and what are the sources; practical applications of data collection and processing and visualisation.

The ultimate goal is to carry out a practical exercise that brings together all the knowledge provided by the lessons to explore the potential of using data in favour of the farm.

Therefore, the farmer must know and understand the exponential growth of data accompanying the digitisation of agriculture through the proliferation of mobile technology, remote sensing technologies, and distributed computing capabilities. Knowing the materials and methods of effective data management for farms will open up new opportunities to improve the lives and livelihoods of farmers by lowering costs and reducing information asymmetries. For farmers, the lack of experience in data management or the adoption of data-driven services can limit the possibilities of digital transformation of the agricultural sector. Data revolution in agriculture and information and communications technology (ICT) for agriculture services can support farmers in addressing their challenges and increasing their incomes and yields.



	<p>Furthermore, the data can support the improvement of agricultural practices towards greater efficiency in the use of resources and a lower environmental impact. This LU wants to support the knowledge of new concepts for farmers concretely. The starting level of knowledge will be probed thanks to an initial questionnaire. A series of theoretical and practical lessons will show understanding through the application, analysis and synthesis of practical work and the "evaluation" phase.</p>				
<p>Connection with another LU or Output materials</p>	<p>In general: connection with lectures about agronomy, agricultural activities (e.g. livestock production, organic farming), technological innovation, and EU common policy.</p> <p>In particular, LU is strictly connected to the previous (LU 5) because the theory and the practical activity are connected to the theory (e.g. content, glossary, evaluation).</p>				
<p>Structure and additional learning methods of the LU</p>	<p>Topic</p>	<p>Hours</p>	<p>Theory</p>	<p>Practice</p>	<p>Additional</p>
	<p>WHAT IS DATA</p>	<p>3</p>			
	<p>SHARING DATA</p>	<p>3</p>			
	<p>DATA QUALITY AND PROVENANCE</p>	<p>6</p>	<p>X</p>	<p>X</p>	
	<p>PERSONAL DATA PROTECTION</p>	<p>6</p>			<p>Expert seminar</p>



	DATA SOURCES	8	X	X	
	HOW DATA IS COLLECTED	8	X	X	Field visit in a best-case study farm
	DATA ANALYSIS AND VISUALISATION	8	X	X	Expert seminar
	EXPLORING THE POTENTIAL OF DATA	10	X	X	Expert seminar
Additional resources from other courses/videos/Apps/tutorials on the topics	Farm Data Management, Sharing and Services for Agriculture Development Online Course (Version v1.0). Zenodo. http://doi.org/10.5281/zenodo.3663553 https://fastplatform.eu/ https://agridata.ec.europa.eu/extensions/DataPortal/home.html https://www.gaia-x.eu/ https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/programmes/digital				
Practical teaching activity (e.g. Workshop/Focus group)	See theory in practice box 1, 2, 3 and subchapter 3.1 in “LU6_AgriSmart_O2_Unit-6_15_02_2021”.				



	<p>In that section, we propose specific examples of practical exercises. They could do it alone or in groups.</p> <p>It is also suggested that a field visit, at least on a farm with crops and livestock productions considered the best-case study for LU purposes.</p>
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