



Co-funded by
the European Union



The FarmForward Project: Sustainable and Transformative Strategies for Climate-Resilient Agriculture in VET

WP2

Climate-Resilient Farming Handbook

Handbook 6 Educational Strategies

Project partners

QUALIFICATIONS AND
VOCATIONAL EDUCATION
AND TRAINING
DEVELOPMENT CENTRE



The FarmForward Project: Sustainable and Transformative Strategies for Climate-Resilient Farming in VET

(2024-1-LT01-KA220-VET-000248582)

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the National Agency. Neither the European Union nor National Agency can be held responsible for them.

Creative Commons License



CC BY-NC 4.0

Creative Commons Attribution-NonCommercial 4.0 International

This license requires that reusers give credit to the creator. It allows reusers to distribute, remix, adapt, and build upon the material in any medium or format, for noncommercial purposes only.

Project Partners

Author	Project Partner

Project Partners

Table of Contents

Introduction	5
Learning Objectives.....	7
Competency Framework and Assessment	9
Proficiency Levels	10
Skill Maps: Defining Competence in Practice	10
Assessment Rubrics: Assessing Competence Fairly and Clearly	12
Micro-Credentials: Recognising Achievement	14
Practical Classroom and Training Strategies	15
Active and Experiential Methods in Climate-Resilient Agriculture VET.....	17
On-Farm Demonstrations	19
Problem-Based Learning	21
Mini-Trials with Learners	22
Digital Learning Approaches in Climate-Resilient Agricultural VET	24
Digital Learning Platforms.....	24
Short Digital Modules.....	24
Dashboards.....	25
Data Walkthroughs.....	26
Mobile Micro-Lessons	26
Interactive Learning Tools	28
Virtual Farm Visits.....	28
Remote and Blended Learning.....	29
Building Local Case Libraries	30

Project Partners

Inclusion and Motivation	32
Supporting Learners with Low Digital Literacy	33
Youth Engagement in Climate-Resilient Agriculture	33
Peer Mentors for Inclusive Learning.....	35
Self-Assessment Questions.....	36
Annexes	38
Glossary	38
Abbreviations.....	39
Referencies	40

Project Partners

Introduction

Preparing the next generation of agricultural professionals to respond effectively to climate change requires a new approach to teaching climate-resilient farming in vocational education and training (VET). Research and practical experience show that theory-based teaching alone is not enough to prepare future farmers for today's challenges. Farmers, VET learners and apprentices need learning that is practical, relevant to their local context and closely connected to real farming decisions (FAO, 2022; EEA, 2024). At the same time, teachers and trainers need clear guidance, high-quality learning resources and effective teaching methods to deliver climate resilience education with confidence. The focus must therefore shift from simply raising awareness to developing practical knowledge, skills and competence.

Effective climate resilience education is engaging, practical and learner-centred. Blended learning, which combines classroom teaching with digital technologies, online activities and hands-on experience, offers both flexibility and meaningful learning opportunities (European Commission, 2020; FAO, 2022). Digital dashboards, climate information platforms, mobile applications and short modular learning resources help learners interpret climate data, strengthen digital and data literacy, and practise making informed farm management decisions (European Commission, 2021; IPCC, 2022).

Practical experience remains at the heart of climate-resilient agricultural education. Learners need opportunities to develop skills in areas such as soil moisture management, climate-adapted crop planning, water-efficient irrigation, livestock heat stress management, farm diversification and risk management. Field demonstrations, on-farm learning, small-scale trials, simulations and other experiential learning activities enable learners to apply knowledge in realistic situations, build confidence and develop the competences required in professional practice (FAO, 2022).

Project Partners

Observing real farming practices, testing different approaches and reflecting on the results help learners strengthen their problem-solving skills, adaptability and readiness for employment.

Local case studies and practical examples make learning even more meaningful. Learners engage more readily when training reflects the climate conditions, farming systems, crops and socio-economic realities of their own regions (EEA, 2024; Lithuanian Ministry of Environment, 2022). Case studies organised around the sequence of **challenge – action – outcome** help learners understand how climate adaptation and mitigation measures are implemented in practice and what results they can achieve. Drawing on examples from countries such as Lithuania, Greece, Slovenia, Poland and Bulgaria makes learning more relevant and easier to relate to than relying solely on distant or abstract examples.

This module presents five complementary pedagogical approaches that can be combined into a practical and integrated framework for teaching climate-resilient agriculture:

- **Competency-based learning** – defined by clear learning outcomes, observable skills, and performance-based assessment, so that learners develop the practical competences they will actually need on the farm.
- **Experiential and practice-based learning** – connecting theory with real farm situations through on-farm demonstrations, problem-based tasks, project-based learning, and mini-trials, so learners can observe, test, and reflect on real agricultural practice.
- **Digital and blended learning** – expanding learning opportunities through digital platforms, simulations, dashboards, and virtual farm visits. Used alongside field-based activities, these tools help learners analyse agricultural data, explore scenarios, and support informed decision-making.

Project Partners

- **Contextual and case-based learning** – using local farm case studies and practical problem-solving activities to help learners understand how different farming practices work under specific environmental and socio-economic conditions.
- **Peer collaboration and knowledge sharing** – across schools, agricultural colleges, advisory services, and EU partner countries. Shared learning environments enable the exchange of teaching materials, case studies, and pedagogical innovations, strengthening collective capacity across the sector.

Together, these approaches create an integrated learning environment that develops the practical competences, critical thinking, and adaptive capacity that climate-resilient agriculture demands. The sections that follow explain each approach and provide practical guidance for putting them into practice in your classroom and in the field.

Learning Objectives

In this module, our aim is to strengthen VET teachers' capacity to apply effective educational strategies when teaching climate-resilient agriculture. The focus is not only on delivering content, but on organising learning in ways that lead to real, practice-based competence.

By the end of this module, teachers will be able to:

- Assess learners' knowledge and practical competences in climate-resilient agriculture.

Project Partners

- Explain the principles of competency-based education and apply them when planning climate-resilience modules: defining what learners must be able to *do* in real farm situations, not only what they must *know*.
- Design and facilitate on-farm demonstrations, problem-based learning sessions, and mini-trials.
- Select and integrate digital learning tools including dashboards, short modules, data walkthroughs, and virtual farm visits.
- Build and use a local case library and involve learners in creating and analysing cases.
- Apply inclusive teaching strategies that support learners with different levels of digital confidence, prior experience, and agricultural background.

This module emphasises that climate-related topics must be taught through real agricultural contexts. Therefore, particular attention is given to hands-on learning, demonstration activities, problem-solving tasks and the analysis of real-life decision-making situations.

Project Partners

Competency Framework and Assessment

This section explains how to assess learners' knowledge, skills and practical competences in climate-resilient agriculture. The aim of assessment is not only to measure what learners know, but also to evaluate how effectively they can apply their knowledge and skills in real farming situations (CEDEFOP, 2021; European Commission, 2020).

A competency-based framework helps teachers clearly define:

- what actions learners should be able to perform,
- how independently they can perform them,
- which criteria are used for assessment,
- how these competences can be recorded and recognised.

Examples of Climate-Resilient Agriculture Competence Areas

Key competence areas in climate-resilient agriculture include (FAO, 2017; European Commission, 2021):

1. Climate risk identification and assessment:

- Identifies major climate risks (e.g., drought, heavy rainfall, heat stress);
- Analyses their impact on a specific farm;
- Develops a basic risk mitigation plan.

2. Soil and water resilience practices:

- Selects appropriate soil conservation measures;
- Plans water-saving or water-retention strategies;
- Evaluates the effectiveness of implemented measures.

Project Partners

3. Adaptive crop and livestock management:

- Selects climate-resilient crop varieties or livestock strategies;
- Adjusts crop rotation or feeding practices according to changing conditions.

4. Sustainable resource use:

- Assesses energy and input use on the farm;
- Proposes efficiency improvements.

5. Data-based decision-making:

- Interprets weather, soil, or farm performance data;
- Justifies management decisions using evidence.

Proficiency Levels

Each competence can be assessed using clear performance levels (Biggs & Tang, 2011):

- **Basic** – understands and can explain concepts.
- **Developing** – applies practices with guidance.
- **Competent** – independently applies practices in real situations.
- **Advanced** – evaluates, adapts and improves practices according to context.

This section introduces three practical tools:

1. Skill Maps.
2. Assessment Rubrics.
3. Micro-credentials.

Skill Maps: Defining Competence in Practice

Skill maps show what learners need to be able to do in a clear and assessable way. They help teachers align:

Project Partners

- teaching content,
- practical activities,
- assessment tasks.

When developing a skill map, teachers should consider:

- What specific tasks must learners be able to perform?
- What knowledge and skills are required?
- How are these competences applied in real farm contexts?

Example: Drought Risk Assessment and Soil Moisture Management

Core Competence

The learner is able to assess drought risk and apply appropriate soil moisture management strategies in a farm context.

Table 1. Competence Areas & Assessment Framework

Competence Area	Observable Actions	Knowledge Base	Basic	Developing	Competent	Advanced
Climate Risk Awareness	Identify drought and heatwave risks; interpret rainfall and temperature data; recognise productivity trends	Climate variability; drought impacts on crops and soil	Describes drought concept	Identifies risk periods with guidance	Independently analyses data	Interprets trends and predicts impacts
Soil & Water	Assess soil type	Soil structure;	Names conservat	Suggests	Selects appropriate	Adapts measures

Project Partners

Resilience Practices	and water retention; select conservation measures ; propose moisture strategies	water infiltration ; conservation techniques	ion methods	measures with guidance	e measures	to farm context and cost
Decision-Making & Justification	Develop adaptation plan; justify decisions using data; explain expected outcomes	Risk management principles; basic cost-benefit logic	Provides general suggestions	Provides relevant but weak justification	Gives clear data-based justification	Evaluates alternatives and long-term sustainability

Application in Teaching

1. Select a competence area.
2. Design real farm-based task.
3. Assess using a four-level scale.
4. Record results and give feedback.

Assessment Rubrics: Assessing Competence Fairly and Clearly

Assessment rubrics make assessment more transparent and consistent for both VET teachers and learners. They go beyond checking whether a task has been completed by describing what successful performance looks like. This helps ensure fair

Project Partners

assessment and provides meaningful feedback that supports learners in recognising their strengths and improving their skills (Brookhart, 2013).

Table 2. Example Rubric Criteria for Climate-Resilient Farming

Competence Area	Excellent	Good	Basic	Needs Support
Identifying Climate Risks	Confidently identifies different climate risks using various sources of information and can think ahead about possible future impacts.	Identifies the main climate risks and uses climate information with limited support.	Recognises some climate risks but needs guidance to explain them clearly.	Finds it difficult to identify or explain climate risks without significant support.
Applying Adaptive Practices	Selects and adapts suitable farming practices confidently and explains why they are appropriate for the specific context.	Chooses and applies appropriate adaptation measures with a good understanding of the situation.	Tries to apply adaptation measures but still needs guidance and support.	Needs considerable support to choose and apply suitable adaptation measures.
Reflecting and Improving	Reflects critically on results, identifies improvements	Reviews outcomes and identifies areas for improvement	Reflects on basic results and suggests simple	Finds it difficult to reflect on outcomes or identify ways

Project Partners

	and uses evidence to improve future decisions and practices.	with some data support.	improvements .	to improve without support.
--	--	-------------------------	----------------	-----------------------------

Rubrics help teachers give clear feedback and help learners understand how to improve.

Micro-Credentials: Recognising Achievement

Micro-credentials provide a focused and recognisable way to validate specific climate-related competences relevant to vocational practice (European Commission, 2022; UNESCO, 2022).



Figure 1. Open badges. Source: UNESCO

As illustrated in Figure 1, micro-credentials are often implemented as digital open badges and offer a flexible and transparent way to recognise specific competences in climate-resilient agriculture.

Unlike full qualifications, they certify targeted capabilities such as:

Project Partners

- Climate risk awareness;
- Soil and water resilience practices;
- Sustainable resource use;
- Digital tools for decision-making;
- Stakeholder engagement.

Micro-credentials can:

- motivate learners through achievable milestones,
- enhance employability by making competences visible,
- support lifelong learning and upskilling,
- align with European skills frameworks and digital recognition systems.

They are particularly effective in VET contexts, where learning is practical, modular, and closely linked to workplace needs (CEDEFOP, 2020).

Practical Classroom and Training Strategies

To ensure effective implementation, VET educators can:

1) Introduce Skill Maps through Guided Discussion

- Ask learners: *“What skills does a climate-resilient farmer need today and in 10 years?”*.
- Co-create a classroom skill map.
- Compare with formal frameworks.

2) Use Rubrics as Learning Tools

- Share criteria before activities.

Project Partners

- Encourage self- and peer-assessment.
- Promote reflection on progress.

3) Use Micro-Credentials for Motivation

- Present them as achievement milestones.
- Link to labour market needs.
- Encourage competence portfolio development.

Why This Important for VET

In VET it is important that climate-resilience training helps learners develop practical skills, not only theoretical knowledge. Learners should be able to apply what they learn in real farming situations and make informed decisions in practice (FAO, 2017; CEDEFOP, 2017; OECD, 2023).

Competency-based assessment focuses on what learners can do in practice, rather than only what they know. For example, instead of simply testing learners' understanding of drought, assessment evaluates their ability to interpret climate information, identify periods of increased risk and select appropriate farm management strategies. Clearly defined performance levels make assessment more transparent, consistent and easier for both teachers and learners to understand.

When assessment tasks reflect real agricultural challenges, learning becomes more meaningful and closely aligned with professional practice. This helps learners develop practical competences that are directly relevant to employment in the agricultural sector. A modular approach to competence development also supports lifelong learning by allowing learners to build knowledge and skills progressively, according to their individual needs, interests and career goals.

Project Partners

Active and Experiential Methods in Climate-Resilient Agriculture VET

Future farmers need more than climate literacy. They need to make decisions under uncertainty, troubleshoot problems on the ground, and apply solutions to real farms in real time (FAO, 2017; OECD, 2023). Experiential learning delivers this. Rather than relying on lectures, it positions learners as active participants: working with real data, observing field conditions, testing adaptation measures, and reflecting on outcomes. When learners do, analyse, and discuss, understanding sticks and transfers to practice (Kolb, 2015). This approach bridges classroom and field. Learners might analyse rainfall data, assess soil conditions on-site and draft an adaptation plan for a specific farm and then reflect on what the results revealed and why. That structured cycle of action, reflection and adjustment is at the core of Kolb's experiential learning model (Kolb, 2015; Beard & Wilson, 2018).

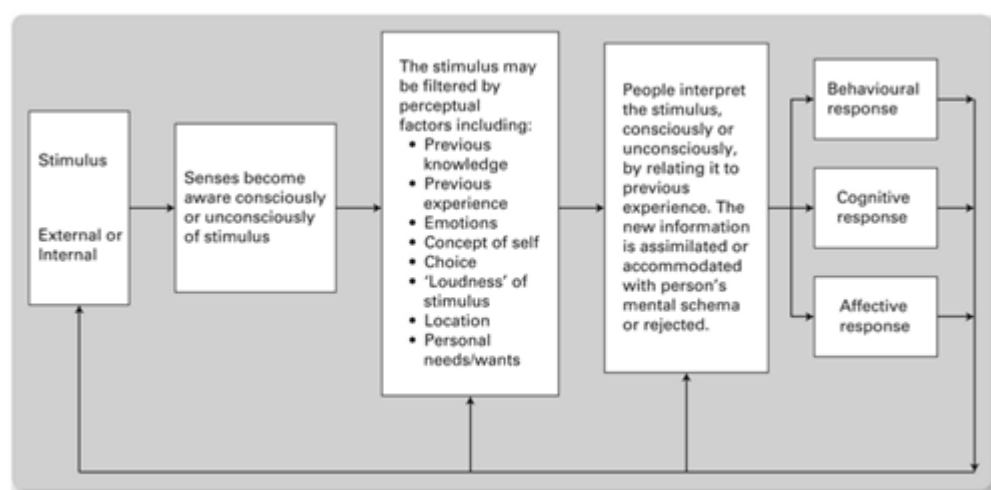


Figure 2. *The process of perception and experiential learning.* Source: Adapted from Beard & Wilson (2018)

Project Partners

Learners engage most when learning connects directly to their work. Farmers respond to tasks that treat them as decision-makers, not as students absorbing theory (Wlodkowski, 2008). Active methods support this by linking learning tasks to real agricultural challenges rather than abstract examples.

Climate change is already reshaping farms across Europe in different ways. Teaching must allow learners to observe those impacts, analyse risks, test responses, and evaluate what works not merely read about them (European Commission, 2021; FAO, 2017). Experiential learning creates realistic learning situations where theory and practice are closely connected.

Climate education that stays in the classroom produces climate awareness. Climate education built around real farm decision-making produces adaptive capacity.

This section focuses on three core methods that are especially relevant for climate-resilient agriculture education in VET:

- On-farm demonstrations;
- Problem-based learning;
- Mini-trials with learners.

In contemporary VET, experiential learning is increasingly strengthened through digital technologies. The role of digital innovation in agriculture and learning is illustrated in Figure 3.

Project Partners

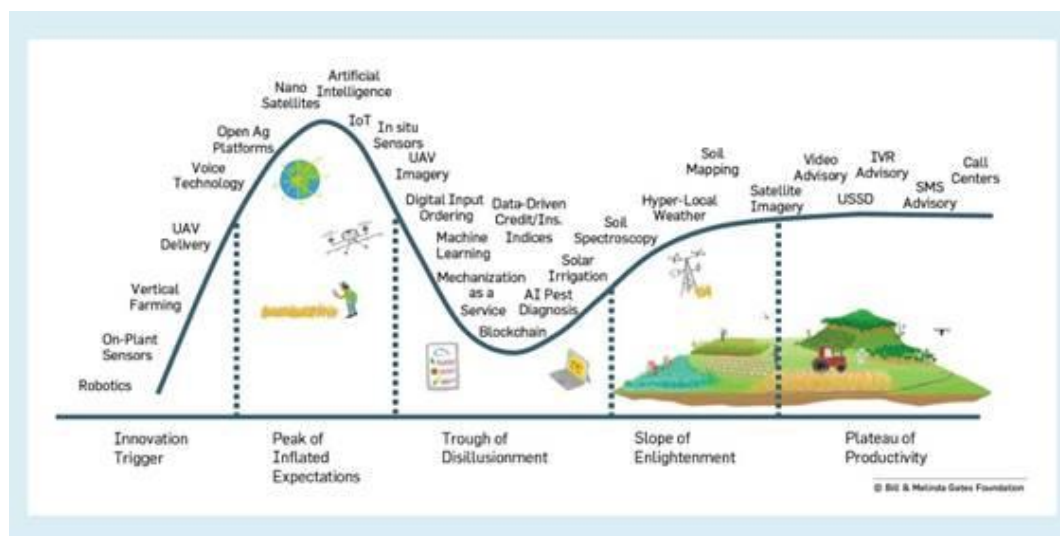


Figure 3. Digital agriculture hype curve for SSPs. Source: [Digital Agriculture for Small-Scale Producers – Communications of the ACM](#)

Research shows that digital tools support learning most effectively when they are used as part of meaningful teaching and learning activities, rather than simply introduced as separate technologies on their own (Tereseviciene et al., 2015). Used well, they help learners collect field data, document observations, visualise results, and collaborate with peers. In climate-resilient farming education, digital tools can therefore enhance, but not replace on-farm demonstrations, problem-based learning, and mini-trials.

On-Farm Demonstrations

On-farm demonstrations place learning where it belongs: in a real farming environment. Learners observe, ask questions, and wherever possible get involved – taking measurements, handling equipment, or recording data. Seeing a climate-resilient practice in action, rather than reading about it, helps learners grasp how and why it works under actual field conditions. Demonstration farms are widely recognised as a powerful channel for spreading innovation and building knowledge across

Project Partners

farming communities (EIP-AGRI, 2021). Learners engage more when they can see a direct link between the activity and decisions they will actually face. On-farm settings make that link visible (Wlodkowski, 2008).

Digital tools can further strengthen these experiences by helping learners collect information, document observations and reflect on what they have seen. For example, mobile devices and simple sensors can be used to record soil conditions, crop performance or climate impacts. Sharing and discussing this information supports deeper understanding and helps transfer learning into practice (Tereseviciene et al, 2015).

On-farm demonstrations are particularly effective for:

- soil management and soil health;
- water-use efficiency;
- biodiversity practices;
- climate risk monitoring using digital tools.

Pedagogical structure

Effective on-farm demonstrations follow a clear, four-stage structure:



Figure 4. *Pedagogical structure of on-farm demonstrations in climate-resilient agriculture. Based on FAO (2018), EIP-AGRI (2021), Kolb (2015), and Wlodkowski (2008).*

1. **Preparation** – learners are first introduced to the climate-related challenge (such as drought, soil erosion or heat stress) and the farming practice that will be demonstrated.
2. **Observation** – learners observe the practice in action, using guiding questions or observation sheets.
3. **Hands-on engagement** – whenever possible, learners actively participate by taking measurements, using equipment or collecting data.
4. **Reflection and discussion** – learners discuss what they observed and consider how the demonstrated practice could be applied on farms they know.

Problem-Based Learning

Problem-based learning (PBL) is especially relevant in climate-resilient agriculture, as farmers often need to make decisions in uncertain situations while balancing environmental, economic and social factors. This approach encourages learners to analyse real problems, explore possible solutions and reflect on their decisions through a step-by-step learning process, illustrated in Figure 5 (Ngongola-Reinke et al., 2022).

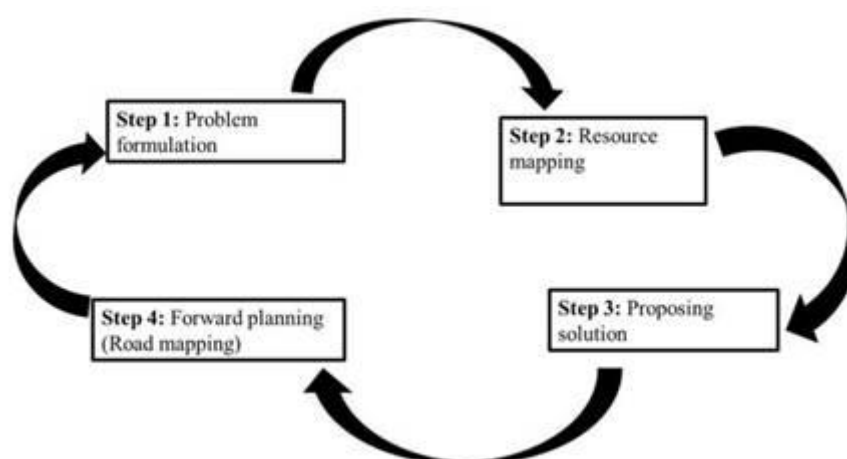


Figure 5. Iterative cycle of problem-based learning in agricultural contexts.

Project Partners

Application in climate-resilient agriculture

Examples of problems explored through PBL may include:

- increasing drought periods and declining crop yields;
- pest outbreaks caused by warmer winters;
- flooding and soil erosion after heavy rainfall;
- balancing short-term productivity with long-term sustainability.

By working with real-life challenges, learners develop analytical thinking, teamwork and evidence-based decision-making skills. Problem-based learning is widely recognized as an effective approach for strengthening adaptive competences in VET (OECD, 2023).

Role of the educator

The educator acts as a facilitator, whose key responsibilities are to:

- support problem definition;
- guide access to reliable data;
- facilitate reflection and discussion;
- ensure links between theory and practice.

Mini-Trials with Learners

Mini-trials are small-scale experiments designed and carried out by learners. They enable learners to test climate-resilient practices in a controlled but realistic way and to observe outcomes over time. Mini-trials support inquiry-based learning and increase learners' confidence in applying new approaches (Pretty, 2018).

Mini-trials are particularly useful for exploring:

Project Partners

- soil moisture conservation techniques;
- performance of crop varieties under stress;
- effects of organic versus mineral fertilisation;
- biodiversity measures at field or plot level.

Key stages of mini-trials

The cyclical learning structure of mini-trials is presented in Figure 6.



Figure 6. Cyclical learning structure of mini-trials in climate-resilient agriculture. Source: based on Pretty (2018), FAO (2022), and Wlodkowski (2008).

Participatory experimentation helps strengthen learning by actively involving learners in testing and exploring solutions in practice. It also supports the wider adoption of climate-smart farming practices.

Project Partners

Digital Learning Approaches in Climate-Resilient Agricultural VET

When integrated into teaching, digital technologies can expand access to learning resources, support collaboration and improve learners' capacity to analyse agricultural data and real farm situations. However, research on technology-enhanced learning shows that digital tools are most effective when embedded in meaningful pedagogical processes rather than used as stand-alone technological solutions (CEDEFOP, 2021).

Digital Learning Platforms

Digital learning platforms such as Moodle and Google Classroom help teachers organise learning by providing one place to share resources, assign tasks, facilitate discussions and stay connected with learners between sessions. In agricultural VET, they are most effective when used alongside hands-on learning. They help learners prepare for practical activities and provide a space to reflect on field experiences, exchange ideas and connect classroom learning with real farming practice.

Short Digital Modules

Short digital modules are brief learning activities, usually lasting around 5–10 minutes, and focused on one specific topic or skill. They are designed to support learning before or after practical activities, rather than replace hands-on experience.

Key principles

- one module focuses on one clear topic (e.g. “What is soil water-holding capacity?”);

Project Partners

- theoretical information is kept short and focused on the main idea;
- learning is directly connected to practical farm or classroom activities.

Benefits in VET education

- help learners prepare for fieldwork and practical tasks;
- allow learners to study at their own pace;
- support understanding of more complex concepts before applying them in practice.

Short digital learning activities are most effective when they are integrated into wider teaching and learning processes, alongside discussion, observation and practical experience (Tereseviciene et al., 2015; CEDEFOP, 2021).

Dashboards

Dashboards are digital tools that present information on soil conditions, weather, crop performance and farm operations in a clear visual format. They help learners interpret data, identify trends and make informed decisions based on real-time information. (FAO, 2017).

Pedagogical value:

- promote active analysis rather than passive observation;
- develop learners' ability to interpret trends;
- use climate data to support informed farm management decisions.

Guided use of dashboards enhances learner confidence and sustained motivation (Wlodkowski, 2008).

Project Partners

Data Walkthroughs

Data walkthroughs guide learners step by step through the interpretation of agricultural data.

Functions:

- provide structured support for beginners;
- reduce anxiety when working with data;
- build confidence in analytical thinking (Teresevičienė et al., 2015);
- use climate indicators to support farm management decisions.

Mobile Micro-Lessons

Mobile micro-lessons are short (1–3 minutes) learning units delivered via mobile devices (videos, audio, SMS).

Functions:

- reinforce learning during everyday practice;
- strengthen the link between theory and practice;
- provide timely reminders and encourage reflection.

Advantages:

- accessible for learners with low digital literacy;
- require minimal infrastructure;
- increase engagement and continuity.

Project Partners

They demonstrate that effective digital learning does not have to be complex. It works best when it is practical, relevant and embedded in everyday learning activities (CEDEFOP, 2021).

Project Partners

Interactive Learning Tools

Interactive tools and simulations help learners explore agricultural processes that are difficult to demonstrate in a traditional classroom. They can be used to visualise plant growth, soil processes, water management and the effects of climate change on farming systems. By working with simulated scenarios, learners can experiment with different farm management decisions and see their potential outcomes in a safe learning environment. When combined with real farm data and hands-on field activities, these tools bridge the gap between theory and practice, helping learners apply their knowledge to real-world decision-making.

Virtual Farm Visits

Virtual farm visits give learners the opportunity to explore farming practices and real-life agricultural situations beyond their local area through videos, digital case studies and online observation.

Benefits:

- introduce learners to different farming systems and management approaches;
- broaden understanding of climate-resilient agricultural practices;
- help prepare learners for field visits and hands-on learning activities (European Commission, 2021).

Although virtual visits cannot fully replace real farm experience, they can effectively support practical learning by improving learners' understanding, confidence and readiness before working in real farm environments.

Project Partners

Remote and Blended Learning

Remote and blended learning combine digital technologies with classroom teaching and practical field-based training in agricultural VET. Online learning gives learners flexible access to educational resources and enables them to participate regardless of their location. At the same time, developing agricultural competences requires hands-on experience that can only be gained through practical activities, field demonstrations and real farm work. Blended learning brings these elements together by combining digital instruction with practical experience, helping learners build professional skills and apply their knowledge in real farming contexts.

The integration of digital technologies into agricultural education creates new opportunities while also presenting practical challenges.

Opportunities	Challenges
• Flexible access to learning resources • Greater participation in agricultural education • Use of real agricultural data and digital tools • Improved collaboration and knowledge sharing	• Limited opportunities for hands-on practice in fully online learning • Unequal access to digital infrastructure • Different levels of digital literacy among learners • Need for pedagogical guidance when interpreting data

Project Partners

Building Local Case Libraries

Climate-resilient agriculture varies across regions, farms and environmental conditions. Learners therefore benefit most from examples drawn from real local farming situations. Local case libraries show how climate-related challenges are addressed in practice, helping learners understand which solutions work under different conditions and why.

A local case library is a collection of real farm examples that show:

- the climate-related problem faced by the farm;
- the actions taken by the farmer;
- the results and lessons learned.

These cases help make learning more practical, relevant and easier to connect with real agricultural work.

To build useful cases, collect simple background information about the farm: local climate conditions, farm type, and the specific challenge being addressed. This information can be gathered through conversations with farmers, field observations, photos, or simple measurements. Involving learners in data collection adds practical value and deepens engagement.

A clear structure makes cases easier to use in teaching:

- **Baseline** – what was the starting situation or problem?
- **Intervention** – what actions or solutions were introduced?
- **Outcome** – what changed and what was learned?

These cases can be used in discussions, problem-solving activities, and practical learning tasks. Learners can also participate in creating local cases themselves,

Project Partners

developing observation, analysis, and decision-making skills through real-life experience.

Key Pedagogical Insight

As illustrated in Figure 7, climate-resilience competence development in agricultural VET is supported by an integrated system combining knowledge sources, digital tools, professional communities, practical learning environments, and continuous professional development.

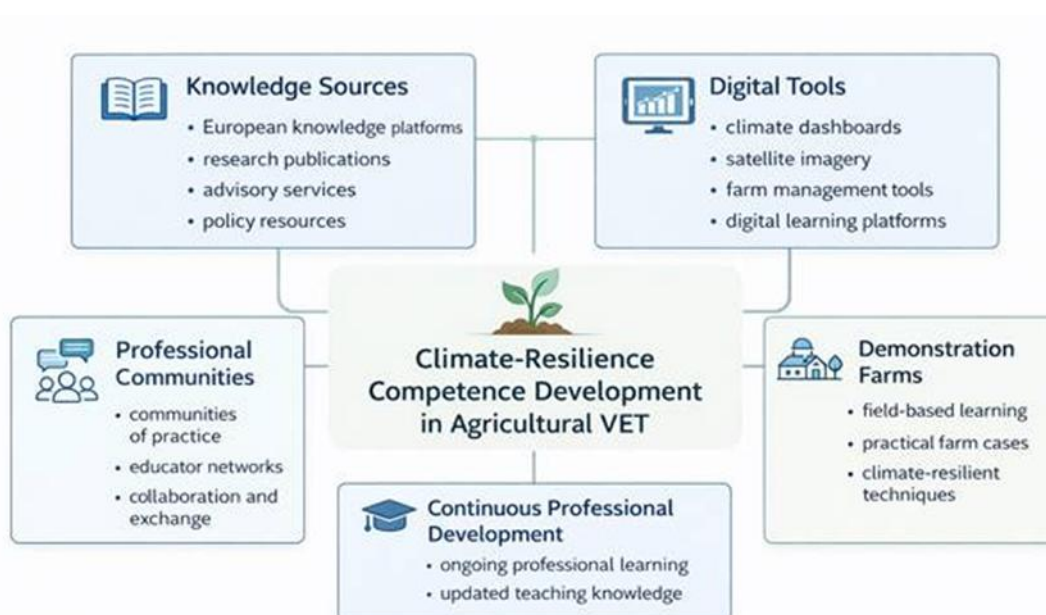


Figure 7. Key components supporting climate-resilience competence development in agricultural VET Source: AI, based on European Commission (2021) and FAO (2017)

Project Partners

Inclusion and Motivation

Climate-resilient agriculture education must be inclusive, accessible, and motivating to achieve meaningful and lasting impact. VET learners come from diverse backgrounds, including young entrants to agriculture, career changers, experienced farmers, and learners from rural areas with limited digital infrastructure. Differences in digital literacy, confidence, and motivation significantly influence learning outcomes and participation (CEDEFOP, 2021; OECD, 2023).

Teachers can better support learners facing educational or social barriers by creating trusting learning environments, adapting instruction to individual needs and encouraging collaboration and peer learning (Volungeviciene et al., 2015; Daukilas et al., 2024).

Adults learn most effectively by building on their own experiences, reflecting on them and applying new knowledge in practice. This means that learners' previous experience and different starting points should be recognised as strengths rather than barriers (Kolb, 2015). Motivation also increases when learning takes place in a respectful, supportive environment and is clearly connected to real professional challenges (Wlodkowski, 2008). This is particularly important when teaching climate change and climate-resilient agriculture, where learners need both confidence and practical skills to respond to complex and evolving challenges.

This section focuses on three key dimensions of inclusion and motivation in agricultural VET:

- supporting learners with low digital literacy;
- engaging young learners;
- using peer mentors to support learning.

Project Partners

Supporting Learners with Low Digital Literacy

Digital tools are becoming increasingly important in climate-resilient farming, but not all learners feel confident using digital platforms, apps or data tools. This is especially common in rural areas, where experience with digital technologies may be more limited. When learners struggle with digital tools, they may feel frustrated or avoid using them altogether. For this reason, it is important to introduce digital learning gradually and in a supportive way (Volungeviciene et al., 2015).

Helpful strategies

- focus only on the most important functions connected to real farming decisions;
- provide clear step-by-step guidance;
- combine digital activities with practical and non-digital learning;
- give learners enough time to practice;
- encourage learners by treating mistakes as a normal part of learning.

A supportive learning environment helps learners build confidence and gradually develop the digital skills needed in modern agriculture.

Youth Engagement in Climate-Resilient Agriculture

Many young learners are aware of climate change and its impact on agriculture, but awareness alone is not enough to encourage action. Learners are more likely to engage when they believe their choices can make a real difference. By building confidence alongside knowledge, teachers can help learners become active contributors to climate-resilient agriculture.

Engagement is stronger when learning:

- is practical and connected to real-life situations;
- focuses on solving real challenges;
- helps learners see themselves as future professionals who can contribute to more sustainable agriculture.

The key dimensions of inclusion and motivation in agricultural VET are illustrated in Figure 8.



Figure 8. Inclusion and motivation framework in agricultural VET, highlighting digital literacy support, youth engagement, and peer mentoring as key drivers of learner participation and learning outcomes. Source: AI.

Effective ways to engage young learners may include:

- practical challenge-based tasks connected to local farming situations;
- digital storytelling activities, such as photos, short videos or field diaries;
- simple gamified activities, such as quizzes and simulations;
- presenting agriculture as an innovative and important profession that plays a key role in addressing climate challenges.

Project Partners

Peer Mentors for Inclusive Learning

Peer mentoring encourages learners to support each other through shared activities, explanations and feedback. Working together in this way can improve confidence, strengthen inclusion and help learners better understand and apply new knowledge, especially in diverse learning groups.

Peer support also helps create a more positive learning environment by reducing anxiety, building a sense of belonging and increasing learners' confidence.

Good peer mentoring practice includes:

- clearly explaining the role of the mentor;
- providing simple guidance and expectations;
- rotating roles so that different learners can take responsibility;
- recognizing and valuing learners' contributions and support to others.

Learning is most effective when it builds on learners' experiences, supports their motivation and uses digital tools to encourage active participation and collaboration. Creating an inclusive learning environment is therefore not an optional addition, but a fundamental part of high-quality vocational education and training.

Project Partners

Self-Assessment Questions

Self-Check Questions

- Can I identify the main principles of competency-based education in agricultural vocational education and training (VET)?
- Can I select an active learning method appropriate for climate-related topics?
- Do I understand the differences between on-farm demonstrations, problem-based learning (PBL), and mini-trials?
- Can I explain how digital tools enhance experiential learning?
- Can I identify inclusive strategies for learners with low digital literacy?
- Do I understand how peer mentoring supports learner motivation?

Knowledge-Based Questions

- How does a competency (skills) map support clearer and more objective assessment?
- Why is experiential learning effective in agriculture teaching?
- What is the role of the teacher in problem-based learning (PBL)?
- What elements make an on-farm demonstration effective?
- How do mini-trials support the learning process?
- Why are local case libraries valuable for learning?
- Why are motivation and engagement essential factors in learning?
- Which strategies are most effective for engaging young learners?

Mini Cases

1. Mini Case: Organising an On-Farm Demonstration

Project Partners

A VET teacher plans a learning activity on soil moisture conservation during drought conditions. The class visits a local farm where mulching and reduced tillage practices are being used. Learners are asked to observe the field conditions, record simple observations and discuss how these practices help retain soil moisture. After the visit, learners reflect on which practices could be transferred to other farms in their region and what additional information would be needed before making decisions.

2. Mini Case: Using Problem-Based Learning in the Classroom

A group of learners receives a scenario describing a farm experiencing declining crop yields after several seasons of irregular rainfall and heatwaves. Working in small teams, learners analyze the possible causes of the problem and develop practical adaptation solutions for the farmer. They must justify their recommendations using available climate and farm information and present their ideas during a class discussion.

3. Mini Case: Creating a Local Farm Case Study

Learners are asked to prepare a short case study about a local farmer who introduced a climate-resilient practice, such as cover crops or improved irrigation. The learners collect information through a short interview, field observations and photographs. Using the structure baseline–intervention–outcome, they present the farm situation, explain the actions taken and discuss the results and lessons learned for climate-resilient farming.

Project Partners

Annexes

Glossary

Climate-resilient agriculture: Farming systems and practices that maintain or improve productivity while adapting to climate variability and extremes, reducing vulnerability to climate risks, and minimising negative environmental impacts.

Climate-smart agriculture (CSA): An approach to agriculture that aims to sustainably increase productivity, enhance resilience (adaptation), reduce or remove greenhouse gas emissions (mitigation), and support food security.

Adaptation: Adjustments in agricultural practices, processes, and systems in response to actual or expected climate change and its impacts, in order to reduce harm or exploit beneficial opportunities.

Blended learning: An educational approach that combines face-to-face instruction with digital and online learning activities.

Competency-based learning: An educational approach that focuses on learners' ability to demonstrate specific skills and apply knowledge in practical contexts.

Climate risk: The potential for adverse impacts resulting from the interaction of climate hazards (e.g. drought, floods, heatwaves), exposure, and vulnerability of agricultural systems.

Data literacy: The ability to read, interpret, and use data to inform decisions, particularly relevant in the use of digital tools and climate information.

Digital decision-support tools: Software or platforms that help farmers and learners analyse data (e.g. weather, soil, crops) and support informed management decisions.

Project Partners

Experiential learning: A learning process through which knowledge is created by transforming experience, typically involving concrete experience, reflection, conceptualisation, and active experimentation (Kolb, 2015).

Micro-credentials: Certified recognition of specific skills or competencies acquired through short, targeted learning activities, often stackable within lifelong learning pathways.

Mini-trial: A small-scale, learner-led experiment designed to test agricultural practices or technologies under controlled or semi-controlled conditions.

Problem-based learning (PBL): A learner-centred teaching approach in which learners work collaboratively to analyse and solve complex, real-world problems without predefined solutions.

On-farm demonstration: A structured learning activity conducted on a real farm where practices, technologies, or systems are shown and discussed under practical conditions.

Abbreviations

CSA – Climate-Smart Agriculture

EEA – European Environment Agency

EIP-AGRI – European Innovation Partnership for Agricultural Productivity and Sustainability

EU – European Union

FAO – Food and Agriculture Organization of the United Nations

IPCC – Intergovernmental Panel on Climate Change

OECD – Organisation for Economic Co-operation and Development

Project Partners

PBL – Problem-Based Learning

UNESCO – United Nations Educational, Scientific and Cultural Organization

VET – Vocational Education and Training

Referencies

Beard, C., & Wilson, J. P. (2018). *Experiential learning: A handbook for education, training and coaching* (4th ed.). Kogan Page.

https://books.google.lt/books?hl=lt&lr=&id=HZAcAAAAQBAJ&oi=fnd&pg=PP1&dq=Experiential+Learning:+A+Handbook+for+Education,+Training+and+Coaching,+4th+Edition+pdf&ots=we4FWn9PII&sig=nUTyW4xWlljLQlrfz1blqW-ve2k&redir_esc=y#v=onepage&q&f=false

Biggs, J., Tang, C., Kennedy, G. (2012). *Teaching for Quality Learning at University*. Open University Press.

https://books.google.lt/books?hl=lt&lr=&id=pseVEAAAQBAJ&oi=fnd&pg=PR13&dq=Teaching+for+quality+learning+at+university&ots=nH1zIKznnh&sig=kz3jB7d0AZJA0QOEeJE9Vsw4l8&redir_esc=y#v=onepage&q&f=false

Brookhard, S. (2013). *How to Create and Use Rubrics*. ASCD.

https://books.google.lt/books?hl=lt&lr=&id=v_9QBAAAQBAJ&oi=fnd&pg=PP1&dq=How+to+Create+and+Use+Rubrics+for+Formative+Assessment+and+Grading&ots=xAbclhD7qv&sig=57XvrVkJFvmCoFSZurRMg_NhIPE&redir_esc=y#v=onepage&q=How%20to%20Create%20and%20Use%20Rubrics%20for%20Formative%20Assessment%20and%20Grading&f=false

CEDEFOP. (2021). *Digital, greener and more resilient: Insights from Cedefop's European skills forecast*. Publications Office of the European Union.

<https://www.cedefop.europa.eu/en/publications/4201>

Project Partners

Daukilas, S., Gedvilienė, G., Sloka, B., Buligina, I., & Anužis, A. (2024). *Vocational education practices for empowerment of vulnerable students in Lithuania and Latvia: The pedagogical and institutional factors*. *Journal of Technical Education and Training*.

European Commission. (2019). *The European Green Deal* (COM(2019) 640 final). European Union. <https://eur-lex.europa.eu>

European Commission. (2020). *A Farm to Fork strategy for a fair, healthy and environmentally-friendly food system* (COM(2020) 381 final). European Union. <https://eur-lex.europa.eu>

European Commission. (2021). *Forging a climate-resilient Europe: The new EU strategy on adaptation to climate change* (COM(2021) 82 final). European Union. <https://eur-lex.europa.eu>

European Environment Agency. (2024). *European climate risk assessment (EUCRA): Executive summary* (EEA Report No. 01/2024). European Environment Agency. <https://www.eea.europa.eu/en/analysis/publications/european-climate-risk-assessment>

Intergovernmental Panel on Climate Change. (2022). *Climate change 2022: Impacts, adaptation and vulnerability*. <https://www.ipcc.ch/report/ar6/wg2/>

FAO. (2017). *Climate-smart agriculture sourcebook*. Food and Agriculture Organization of the United Nations. <https://www.fao.org/3/i3325e/i3325e.pdf>

FAO. (2025). *Innovating with Farmer Field Schools to accelerate transitions toward sustainable, resilient and fair agrifood systems*. <https://www.fao.org/3/I9076EN/i9076en.pdf>

Project Partners

Food and Agriculture Organization of the United Nations. (2022). *FAO strategy on climate change 2022–2031*. FAO. <https://openknowledge.fao.org/items/7b9bf435-b12b-4abf-94c0-4806d3b97109>

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd ed.). Pearson Education. https://www.researchgate.net/publication/315793484_Experiential_Learning_Experience_as_the_source_of_Learning_and_Development_Second_Edition

Lithuanian Ministry of Environment. (2022). *National climate change and green transformation policy documents relevant to agriculture*. Ministry of Environment of the Republic of Lithuania.

Organisation for Economic Co-operation and Development. (2019). *OECD Skills Strategy 2019*. OECD Publishing. https://www.oecd.org/content/dam/oecd/en/publications/reports/2019/05/oecd-skills-strategy-2019_g1g9ff20/9789264313835-en.pdf

Organisation for Economic Co-operation and Development. (2021). *Teachers and leaders in vocational education and training*. OECD Publishing.

https://www.oecd.org/content/dam/oecd/en/publications/reports/2021/03/teachers-and-leaders-in-vocational-education-and-training_5641deea/59d4fbb1-en.pdf

Organisation for Economic Co-operation and Development. (2023). *Building future-ready vocational education and training systems*. OECD Publishing.

https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/07/building-future-ready-vocational-education-and-training-systems_3dd46aae/28551a79-en.pdf

Organisation for Economic Co-operation and Development. (2025). *Vocational education and training (VET) and the green transition*. OECD Publishing.

Project Partners

https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/07/vocational-education-and-training-and-the-green-transition-in-finland_5808ef0a/4d29a34a-en.pdf

Volungevičienė, A., Teresevičienė, M., Žydzīūnaitė, V., Kaminskienė, L., Rutkienė, A., Trepulė, E., & Daukilas, S. (2015). *Technologijomis grindžiamas mokymas ir mokymasis organizacijoje*. Vytauto Didžiojo universitetas.

https://www.researchgate.net/publication/281289157_Technologijomis_grindziama_s_mokymas_ir_mokymasis_organizacijoje

Wlodkowski, R. J. (2008). *Enhancing adult motivation to learn: A comprehensive guide for teaching all adults* (3rd ed.). Jossey-Bass.
https://ekladata.com/iJLoOLufKEurVuG5mA2Ke1rJ5dQ/-Raymond_J._Wlodkowski-_Enhancing_adult_motivation-Bokos-Z1-.pdf

UNESCO-UNEVOC. (2022). *UNESCO strategy for TVET 2022–2029: Transforming TVET for successful and just transitions*. UNESCO-UNEVOC.

Project Partners