Advancing Digital Skills in European Farmer Advisors

D 2.1 Report on best practices in training delivery towards the agricultural sector

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D2.1- Report on best practices in training delivery towards the agricultural sector

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1. Introduction

1.1 DigiFarm and WP2 context

The DigiFarm project aims to strengthen the capacity of farmer advisors to support the digital, environmental, and economic transition of the agricultural sector. Despite the increasing availability of advanced digital and data-driven solutions, the uptake of smart farming technologies in practice remains limited. Strengthening the competences of farmer advisors is therefore essential to bridge the gap between research, technology providers and farmers, and to support more sustainable, productive and resilient farming systems. As farming increasingly relies on remote sensing data, smart farming technologies, and sustainability-oriented practices, farmer advisors play a central role in helping farmers adopt, interpret, and apply these tools in real farm settings.

Within DigiFarm, Work Package 2 (WP2) establishes the pedagogical and methodological foundation of the project. It does so through four complementary activities: **A1**- Identification and benchmarking of best

practices in interactive training delivery towards agricultural sector, **A2**-Formulation of the learning groups, **A3**-Definition of the learning objectives and the training programme structure and **A4**-Definition of the methodology and criteria to assess the learning programme's quality. Together, these activities provide the basis for the development of the DigiFarm training modules in WP3 and their implementation and demonstration in WP4.

1.2 Objective of Deliverable 2.1

This report constitutes Deliverable 2.1, produced under WP2 – Activity 1, which focuses on the identification and benchmarking of best practices in interactive training delivery towards the agricultural sector. Its purpose is to provide an overview of how past and on-going trainings for farmer advisors have been delivered and to identify which methods are most effective. The report compiles and benchmarks existing training programmes, digital platforms, and learning initiatives relevant to the four DigiFarm thematic areas which are:

A. Remote Sensing (RS) technologies and applications (crop type and agricultural practice monitoring, soil characteristics, phenology, crop productivity and health assessment, weather forecasting);
B. Tools and data for smart farming (familiarity with RS software and tools, RS data integration with other data sources, such as soil, weather, and climate data, familiarity with data management, Decision Support Systems, case studies)
C. Green and soft skills: Communication with farmers, Environmental Social and Governance (ESGs), European Financial Reporting Advisory Group (EFRAG) sustainability standards, circular economy principles);
D. Business development- Cost benefit analysis on digital agricultural tools, Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis, Return on Investment (ROI), Return on Equity (ROE), balance sheets.

1.3 Target group

The analysis presented in this report focuses on farmer advisors, including agricultural consultants, extension agents, agronomists, and advisory service providers, as well as closely related intermediary profiles involved in supporting farmers' decision-making. These professionals operate at the interface between research, technology providers, policy frameworks, and farming practice, requiring explicit knowledge and skills to communicate effectively with farmers, and support economic and environmental decision-making.

In line with the findings of the DigiFarm Deliverable D2.2 – Report on the learners' profiles and expectations, the DigiFarm potential advisory participants are grouped into four distinct learning profiles:

- **Traditional Advisors – Entry Digital Level.** Advisors with low digital skills, limited technical knowledge, and little or no use of digital tools.
- **Emerging Smart Farming Implementers with Knowledge Gaps.** Advisors with medium digital skills and tool use but limited theoretical knowledge. They require stronger understanding and interpretation of smart farming technologies.
- **Emerging Smart Farming Implementers with Cost Barriers.** Advisors with medium digital skills and medium knowledge levels, with some adoption of tools already in place. Training needs focus on scaling adoption, including understanding return on investment and cost–benefit aspects.
- **Farming Implementers – Advanced Level.** Advisors with high digital skills and technical knowledge. Training s needs focus on data integration and practical smart farming applications.

These differentiated profiles confirm that a universal approach to training is not appropriate for the DigiFarm target group. Instead, best practices in training delivery must support flexible, modular and differentiated learning pathways that respond to the diverse learners needs, professional roles, and sustainability engagement of farmer advisors. For this reason, the benchmarking of best practices in this report explicitly considers how training methods can accommodate multiple learner profiles within the same overall training framework.

2. Methodology for Identification and Benchmarking of Best Practices

The identification and benchmarking of best practices in training delivery towards the agricultural sector was carried out through a structured, comparative methodology designed to reflect the diversity of learning models, technologies, and professional contexts of farmer advisors across Europe. This method combines desktop research and partner contributions based on multi-criteria benchmarking framework. The benchmarking criteria were selected to be aligned with the DigiFarm objectives, the differentiated learner profiles of farmer advisors, and internationally recognised adult-learning (andragogical) quality frameworks for agricultural e-learning, particularly those developed by the Food and Agriculture Organization of the United Nations (FAO)[1]. They are also grounded in Malcolm Knowles' adult learning theory (andragogy), which recognises that adult learners are self-directed, bring prior professional experience, learn best through relevance and application, and require flexibility in learning design [2,3].

Step 1 – Desktop research and mapping of existing practices

A systematic desk review was done aiming at identifying existing training programmes, digital platforms, and learning initiatives relevant to agricultural advisory services. The search focused on past and ongoing training activities across the four DigiFarm training domains:

(A) Remote sensing and Earth Observation,

(B) Tools and data for smart farming,
(C) Green and soft skills, and
(D) Business development for digital agriculture.

Sources included European and international e-learning platforms, Erasmus+ and Horizon project outputs, professional academies, university modules, and operational smart-farming and decision-support systems. This ensured that both formal training courses and practice-oriented digital environments used by advisors were captured.

Step 2 – Setting the benchmarking criteria

To enable a meaningful comparison between practises among the heterogeneous learning initiatives, a set of common benchmarking criteria was selected, derived from the DigiFarm objectives and from the professional context and learning profiles of farmer advisors identified in Deliverable D2.2. The criteria included:

- **Delivery mode** (e.g. online synchronous, online asynchronous, blended, recorded, self-paced, tutor-supported),
- **Level of interactivity** (e.g. quizzes, simulations, dashboards, case studies, peer learning),
- **Assessment and feedback mechanisms** (e.g. self-tests, assignments, practical tasks, forums, certification),
- **Andragogical approach and best-practice features** and
- **Suitability for different learner profiles** (traditional, smart-farming-oriented, sustainability-oriented advisors).

Step 3 – Partner contributions and validation

In parallel with the desk research, DigiFarm partners were invited to contribute examples of relevant training programmes, platforms, and tools based on their institutional expertise and national advisory networks. ECoE, as the leader of this activity, initiated and coordinated the process, carried out core research, and consolidated all partner inputs. NOA, Confagricoltura, NANG, and UCD provided additional examples based on their professional experience, reflecting different advisory systems, training cultures, and levels of digital maturity across partner countries.

All collected information was compiled in a shared file, using the Excel framework. All mapped practices were analysed against the benchmarking criteria to identify patterns, strengths, and limitations across the four DigiFarm training domains. Preliminary results of the benchmarking and identified best practices were presented and discussed at the 3rd DigiFarm Steering Committee meeting, where they were reviewed and validated by the consortium. The agreed analytical framework, based on the defined benchmarking criteria,

enabled the direct comparison of highly diverse learning formats, including MOOCs, professional academies, university modules, farm management platforms, and IoT-based decision-support systems.

3. Benchmarking and Best Practices across DigiFarm Training Domains

This section presents the results of the benchmarking analysis based on the Excel-based mapping of training initiatives (Annex I), digital platforms, and learning resources identified in WP2 – Activity 1. The analysis is structured according to the four DigiFarm training domains defined in WP3:

(3.1) Remote Sensing and Earth Observation (EO) applications,
(3.2) Tools and data for smart farming,
(3.3) Green and soft skills, and
(3.4) Business development for digital agriculture.

For each domain, the collected practices are examined using the common benchmarking methodology described in Section 2, enabling a systematic comparison of how different types of knowledge and competences are delivered through a variety of learning environments, including online courses, blended programmes, professional academies, academic modules, and operational digital platforms.

3.1 Remote Sensing and Earth Observation Applications

The benchmarking of Remote Sensing and EO training was based on five main initiatives identified in the Excel mapping such as international open learning platforms, professional e-learning programmes, Erasmus+ project-based training environments, advanced academic courses, and application-driven webinar series, namely:

1. EO College – “Towards Zero Hunger: Agriculture & Livestock” (ESA)[1]
2. FAO eLearning Academy – Hyper-temporal Remote Sensing for Agricultural Monitoring[2]
3. CLASS365 – ReSense: Remote Sensing Technologies (Erasmus+ project-based platform)[3]
4. ESA & Aristotle University of Thessaloniki – Advanced Training Course on Land Remote Sensing for Agriculture[4]
5. NASA ARSET – Satellite Remote Sensing for Agricultural Applications[5]

The benchmarking results are presented below according to the agreed evaluation criteria:

[1] https://eo-college.org/courses/zero-hunger-agriculture-livestock/
[2] https://elearning.fao.org/course/view.php?id=330
[3] https://class365.eu/course/view.php?id=10
[4] https://eo4society.esa.int/resources/14th-advanced-training-course-on-land-remote-sensing-agriculture/
[5] https://appliedsciences.nasa.gov/get-involved/training/english/arset-satellite-remote-sensing-agricultural-applications

Delivery mode

EO training is delivered mainly through **fully online formats**, combining:

- **Asynchronous self-paced learning** (videos, modules, datasets, quizzes), and
- **Synchronous online sessions** (live webinars and guided exercises), which are often recorded and reused as self-study material.

Asynchronous online courses are particularly effective for introducing EO concepts and for supporting digitally under-equipped advisors, as they provide flexible, low-pressure learning environments that allow learners to progress at their own pace. In contrast, synchronous online formats are more effective for technically advanced advisors, as they enable guided interaction with EO data, tools, and analytical workflows, supporting deeper engagement and practical skill development.

Although some EO training programmes also use blended formats that combine online and physical participation, DigiFarm should rely on online synchronous-to-asynchronous delivery, which offers both pedagogical depth and scalability and accessibility without requiring face-to-face training.

Level of interactivity

Effective EO training requires learner interaction with data, digital tools and real-world scenarios. Benchmarking identified a range of practices with different degrees of interactivity, including text-based learning, videos and quizzes, as well as more advanced formats such as case studies, practical exercises, participation tasks and applied activities. While low-interactivity formats such as text and video support basic understanding and awareness, higher-interactivity approaches that involve analysing datasets, working through realistic farm scenarios, and interpreting observable EO indicators (such as crop stress, drought conditions or vegetation status) are much more effective in building operational skills.

Assessment and feedback

The benchmarking identified several assessment types used in EO and digital agriculture training. Most programmes rely on automated quizzes and self-tests to verify understanding of EO concepts and terminology, often linked to certification. Many also include practical exercises using real EO data, requiring learners to analyse satellite datasets, calculate indicators, or interpret imagery. In instructor-led and blended formats, assessment is often participation-based, focusing on attendance, engagement and completion of guided tasks. More advanced programmes use project-based assessment, where learners produce concrete outputs such as maps, reports or EO analyses through assignments or presentations. In many cases, feedback is collected using post-course evaluation forms to assess training quality, identify gaps and support the design of future training activities. For DigiFarm, which will operate primarily in an online asynchronous mode, combining self-paced EO data exercises with discussion forums and applied assignments will be essential to ensure both accessibility and meaningful skill development.

Andragocical approach and best-practice features

Across the analysed initiatives, best-practice EO training is characterised by:

- Modular learning pathways,
- Use of real or realistic EO datasets,
- Case-based agricultural applications, and
- Visual, map-based interpretation tools.

Training that embeds EO data within agronomic contexts (crops, soils, livestock, drought, biomass) is more effective than generic remote-sensing instruction.

Suitability for different learner profiles

Digitally under-equipped advisors benefit most from guided, modular, visually rich EO learning that builds confidence step by step. Technically advanced advisors benefit most from hands-on EO data environments and guided analytical exercises. Sustainability-oriented advisors benefit from EO tools that quantify crop stress, water use, and environmental performance but practical exercises, participation tasks, and applied assignments provide much stronger evidence of a learner's ability to interpret EO data and support farm decision-making.

Conclusion

The benchmarking shows that Remote Sensing and EO training is most effective when delivered through online modular learning combined with interactive digital tools that allow advisors to explore EO maps, indicators, and datasets in a guided way. Visual dashboards, case-based exercises, and structured learning paths support the development of practical advisory competences more effectively than static or theory-based content alone. At the same time, interactive EO environments must be accompanied by clear guidance and step-by-step workflows to remain accessible for digitally under-equipped advisors. For DigiFarm, EO training should therefore be implemented through online courses integrated with web-based EO tools, offering modular, visual, and practice-oriented learning pathways adapted to the three learner profiles.

3.2. Tools and data for smart farming

Benchmarking of tools and data for smart farming was performed across a diverse set of training platforms, digital tools, and learning initiatives[6], FAO e-[7][8][9][10], Quantifarm[11,12,13,14]), and operational smart-farming systems (e.g. CropX [15]).

Delivery mode

[6] World Bank Group Academy, e-Learning on Digital Agriculture
[7] https://elearning.fao.org
[8] https://www.coursera.org
[9] https://www.aionacademy.online
[10] https://itfarm.trebag.hu
[11] https://quantifarm.eu/online-educational-platform-dia/
[12] https://hub.ucd.ie
[13] https://ag.purdue.edu/department/agry/elearning-academy/precision-agriculture.html
[14] https://www.wur.nl/en/education/for-professionals/programmes-and-courses/summer-school-intelligent-agriculture
[15] CropX-Training and Webinars Information

Smart-farming training is delivered mainly through fully online formats, combining asynchronous self-paced learning (videos, manuals, datasets, and quizzes) with synchronous online sessions (webinars, live demonstrations, and guided exercises), which are often recorded and reused for self-study. Self-paced formats are effective for introducing digital farming tools and for supporting digitally under-equipped advisors, while synchronous formats are more effective for technically advanced advisors who need guided interaction with platforms, dashboards, and data integration workflows.

Level of interactivity

The benchmarking identified a wide range of interactive models in smart-farming training, ranging from content-based learning using videos, readings, case studies and quizzes, to guided learning with structured exercises, self-assessment and peer discussion, and further to direct interaction with digital-farming platforms where users can map fields, analyse EO and sensor data, and explore decision-support outputs such as irrigation or pest recommendations. Some programmes also include data creation and system setup, such as configuring sensors or integrating data streams, enabling deeper technical and innovation skills but requiring greater support. For DigiFarm's online, largely asynchronous framework, the benchmarking indicates that a layered combination of content-based learning, guided exercises and interaction with real or simulated digital-farming platforms offers the best balance between inclusivity, scalability and the development of operational, data-driven advisory skills.

Assessment and feedback

The benchmarking shows that most online courses rely on quizzes and self-tests to verify understanding of digital agriculture technologies, climate-smart practices, IoT and precision farming, often linked to course completion or certification. Several trainings also include practical and case-based exercises in which learners analyse scenarios and work through guided activities related to farm management, sensors, EO and decision-support tools. It further indicates that different assessment methods align with different levels of learner experience and training depth, with quizzes and self-tests supporting introductory and awareness-level learning, case-based and guided exercises addressing intermediate advisory skills, and tool-based tasks, performance indicators and system-setup assignments reflecting advanced operational and technical competence in digital farming.

Andragogical approach and best-practice features

Best-practice smart-farming training is characterised by:

- Modular learning pathways that allow progressive skill development,
- Use of real digital tools and datasets,
- Case-based learning linked to real farm scenarios, and
- Integration of multiple data sources (EO, soil, weather, sensor data, management records).

Training that connects digital tools to concrete advisory decisions (irrigation, fertilisation, pest management, productivity, sustainability) is significantly more effective than tool-agnostic or theory-based instruction.

Suitability for different learner profiles

Digitally under-equipped advisors benefit most from guided, modular, and visually rich digital platforms that introduce smart-farming tools step by step. Technically advanced advisors benefit most from data-intensive platforms and DSS environments that allow them to integrate EO, IoT, and management data for complex advisory tasks. Sustainability-oriented advisors benefit from tools that quantify resource use, emissions, and environmental performance, supporting evidence-based sustainability advice.

Conclusion

The benchmarking indicates that smart-farming training benefits from being delivered through modular online learning environments that are closely linked to interactive digital tools enabling learners to work with farm data, EO layers, IoT outputs and decision-support concepts. Visual dashboards, case-based exercises and structured digital workflows support the development of practical advisory competences more effectively than static content alone. For DigiFarm, this implies that smart-farming training be implemented through online courses that are connected to, or simulate digital farm-management and DSS environments, allowing modular, data-driven and learner-adapted pathways aligned with the three DigiFarm learner profiles.

3.3. Green and soft skills

The benchmarking of this topic focused on structured online and academic training programmes addressing sustainability, circular economy, climate-smart agriculture and advisory communication. These included international and academic learning initiatives such as FAO[16] and Sustainable Development Goals (SDG) Academy courses on climate-smart agriculture and sustainability[17], the University College Dublin Circular Bioeconomy Principles modul[18][19]e Erasmus+ Digital Course in Circular Agriculture. Together, these programmes cover key elements of green and soft skills, including sustainability and circular-economy principles, food security, value-chain and waste-reduction concepts, and the communication and advisory competences needed to support farmers and agri-food stakeholders in the green transition.

Platforms such as the EFRAG Knowledge Hub and circular-economy knowledge portals were considered as reference and support resources for ESG and sustainability standards but were not included in the benchmarking sample as they do not provide structured training programmes with defined learning pathways and assessment components.

[16] FAO Search | FAO elearning Academy
[17] SDG Academy courses
[18] UCD Course Catalogue, BSEN30650 Circular Bioeconomy module description: Link here
[19] Open eClass - Univ. of the Aegean | Introduction to Circular Agricul...

Delivery mode

Green and soft skills training is delivered mainly through fully online formats, combining asynchronous self-paced learning (videos, guidelines, case studies, and reading materials) with synchronous online events (webinars, expert sessions, and discussion-based learning), which are often recorded and reused. Asynchronous formats are effective for building conceptual understanding of sustainability, ESG, and circular economy principles, while synchronous formats support reflection, dialogue, and contextualisation of sustainability concepts in real advisory settings.

Level of interactivity

Interactivity in green and soft skills training was found to be mainly provided through case studies and scenario-based learning, group discussions and peer exchange, reflective exercises and guided questions, and webinars with expert interaction. In contrast to technical training, interactivity is less tool-based and more dialogue- and reflection-oriented, reflecting the need to develop communication skills, sustainability awareness and advisory judgement.

Assessment and feedback

Most green and soft skills programmes rely on self-assessment, quizzes, reflective exercises, and participation-based evaluation rather than formal examinations. Academic courses (e.g. UCD) use group work and individual projects, while platforms such as FAO and SDG Academy include self-assessment quizzes and feedback mechanisms. These approaches support learning focused on understanding, application, and critical reflection rather than technical performance.

Andragogical approach and best-practice features

Best-practice around the green and soft skills training topic is characterised by:

- Clear conceptual frameworks (e.g. Environmental, Social and Governance (ESG), Corporate Sustainability Reporting Directive (CSRD), circular economy, climate-smart agriculture),
- Real-world case studies from agriculture and agri-food systems,
- Problem-based and reflective learning, and
- Integration of sustainability principles with farming practice.

Training that links sustainability standards and environmental goals to farm-level decisions and advisory practice is more effective than abstract or policy-only content.

Suitability for different learner profiles

Digitally under-equipped advisors benefit from structured, accessible sustainability content that explains ESG and circular economy principles in practical terms. Technically advanced advisors benefit from data-informed sustainability frameworks that link environmental performance to digital tools. Sustainability-

oriented advisors benefit most from standards-based and impact-oriented training (e.g. ESG, CSRD, CSA) that support evidence-based sustainability advisory.

Conclusion

The benchmarking shows that green and soft skills training is most effective when delivered through online learning environments that combine conceptual frameworks with practical, case-based and reflective learning. Dialogue-oriented formats, expert webinars, and scenario-based exercises are particularly important for developing communication skills and sustainability-oriented advisory competences. For DigiFarm, green and soft skills should therefore be delivered through online modules supported by case studies, reflective activities, and expert-led sessions, integrated with the digital and EO-based tools of the other training domains.

3.4 Business development for digital agriculture

The benchmarking analysis in the topic of business development trainings for digital agriculture was based primarily on targeted advisory-oriented and vocational learning initiatives identified notably the Quantifarm Digital Innovation Academy (DIA)[20], the FAO eLearning Academy (Agripreneurship 101)[21], and complementary digital-farming courses. These programmes address the economic, financial and decision-making aspects of adopting digital agricultural technologies.

Delivery mode

Business development training is delivered mainly through fully online asynchronous formats, using self-paced modules, downloadable learning materials, and structured digital toolkits. These formats are well suited to professional advisors, as they allow flexible learning alongside advisory work and enable repeated consultation of financial and decision-support material. Although some entrepreneurship programmes also use live or blended formats, DigiFarm should consider the delivery method of online asynchronous and synchronous-to-asynchronous, which supports scalability and continuous professional use.

Level of interactivity

Interactivity in business development training is provided primarily through:

- Digital toolkits and calculators,
- Scenario-based learning,
- Decision-support frameworks, and
- Case-based examples of technology adoption.

In the Quantifarm platform, for example, advisors interact with DATS (Digital Agriculture Technology Solutions) evaluation tools to assess costs, benefits, and sustainability impacts. Such tool-based interactivity is significantly more effective than text-based financial explanations alone.

[20] https://quantifarm.eu/online-educational-platform-dia/
[21] Course: Agripreneurship 101 | FAO elearning Academy

Assessment and feedback

Assessment in business-oriented digital agriculture training focuses on self-evaluation and decision-support outputs rather than formal exams. Tools that generate cost-benefit indicators, adoption scenarios, and sustainability metrics provide immediate feedback on advisory choices. This form of embedded feedback is particularly effective for developing practical business advisory competences.

Andragogical approach and best-practice features

Best-practice business development training is characterised by:

- Clear links between digital tools and farm economics,
- Use of real or realistic farm data,
- Scenario-based investment analysis, and
- Decision-support frameworks for adoption and non-adoption of technologies.

Training that integrates financial, operational, and sustainability impacts of digital tools is more effective than generic entrepreneurship or farm management instruction.

Suitability for different learner profiles

Digitally under-equipped advisors benefit from structured, guided business tools that simplify cost-benefit analysis and investment decisions. Technically advanced advisors benefit from data-rich evaluation tools that integrate performance, sustainability, and economic indicators. Sustainability-oriented advisors benefit from business models that link environmental performance to financial viability, supporting green transition advisory.

Conclusion

The benchmarking shows that business development training for digital agriculture is most effective when delivered through online decision-support environments that allow advisors to evaluate the economic, operational, and sustainability impacts of digital tools. Tool-based interactivity, scenario analysis, and data-driven cost-benefit frameworks support much stronger advisory competence than static financial content. For DigiFarm, business development training should therefore be implemented through online modules integrated with digital evaluation and advisory toolkits, enabling advisors to support informed, sustainable technology adoption across diverse farm contexts.

4. Conclusion and Recommendations

This section synthesises the results of the benchmarking analysis and translates them into concrete recommendations for the design, implementation, and validation of the DigiFarm training programme in WP3 and WP4. Across all four DigiFarm training domains, the benchmarking and partner validation identified a consistent set of best practices for effective training of farmer advisors:

Delivery & access

- Free, online and globally accessible training maximises participation and inclusiveness.
- Synchronous-to-asynchronous model: Live online sessions (webinars, guided exercises, Q&A) combined with recorded videos and downloadable materials provide both engagement and flexibility.
- Self-paced access allows advisors to learn according to their time availability and professional needs.

Learning structure

- Modular micro-learning design (short units, sub-topics, progressive levels) supports heterogeneous advisory communities and allows learners to move from introductory to advanced levels.
- Multi-level pathways (informative, basic, advanced/master) enable differentiation without creating separate courses.

Interactivity & engagement

- Case-study-centred learning using real agricultural examples (crop mapping, irrigation, vegetation, livestock, sustainability indicators) increases relevance and motivation.
- Hands-on digital tools, datasets, dashboards and videos outperform passive content.
- Communication channels (platform forums, chats, national groups) reinforce peer learning and engagement.

Assessment & motivation

- Self-assessment quizzes allow learners to:
  - Check understanding,
  - Progress between levels,
  - Learn flexibly in their own time.
- Certificates of successful completion are a strong motivational tool and align with professional practices of farmer advisors.
- Online evaluation forms support continuous improvement.
- Learner tracking and records are necessary for quality assurance, certification and reporting.

Alignment with learner profiles

This modular, interactive and flexible learning model allows DigiFarm to effectively serve all three advisor profiles identified in Deliverable D2.2: digitally under-equipped advisors benefit from guided visual learning, smart-farming advisors from hands-on tools and data, and sustainability-oriented advisors from digital indicators embedded in real advisory cases.

These practices were observed across MOOCs, professional academies, Erasmus+ platforms, university programmes and smart-farming systems, and were validated by consortium partners, including NANG as administrator of the Cultivate Academy platform.

4.2 Platform feasibility

NANG, as administrator of the Cultivate Academy e-learning platform (https://www.cultivateacademy.org), confirmed that all identified best practices are technically supported within the DigiFarm training environment. Cultivate enables modular self-paced courses, recorded online sessions, interactive quizzes, downloadable learning materials, multilingual content and subtitles, learner tracking, and digital certification. This allows DigiFarm to deliver training in multiple languages and countries in a scalable way, without the need for physical presence or repeated live delivery.

4.3 Final recommendation

The current work suggests that DigiFarm could be implemented as a free, modular and highly interactive online training ecosystem**,** based primarily on self-paced learning enriched with recorded expert input, real data, and digital tools**.** This model supports multilingual delivery in English, Greek and Italian**,** ensuring both pan-European and national accessibility across Cyprus, Greece, Italy and Ireland, while at the same time maintaining high pedagogical quality, flexibility for advisors, and efficient use of project resources. By combining interactive content, case-based learning, self-assessment and certification, DigiFarm can effectively support the digital, green and economic transition of European agricultural advisory services.

Table 1. Summary of Recommended DigiFarm Best Practices

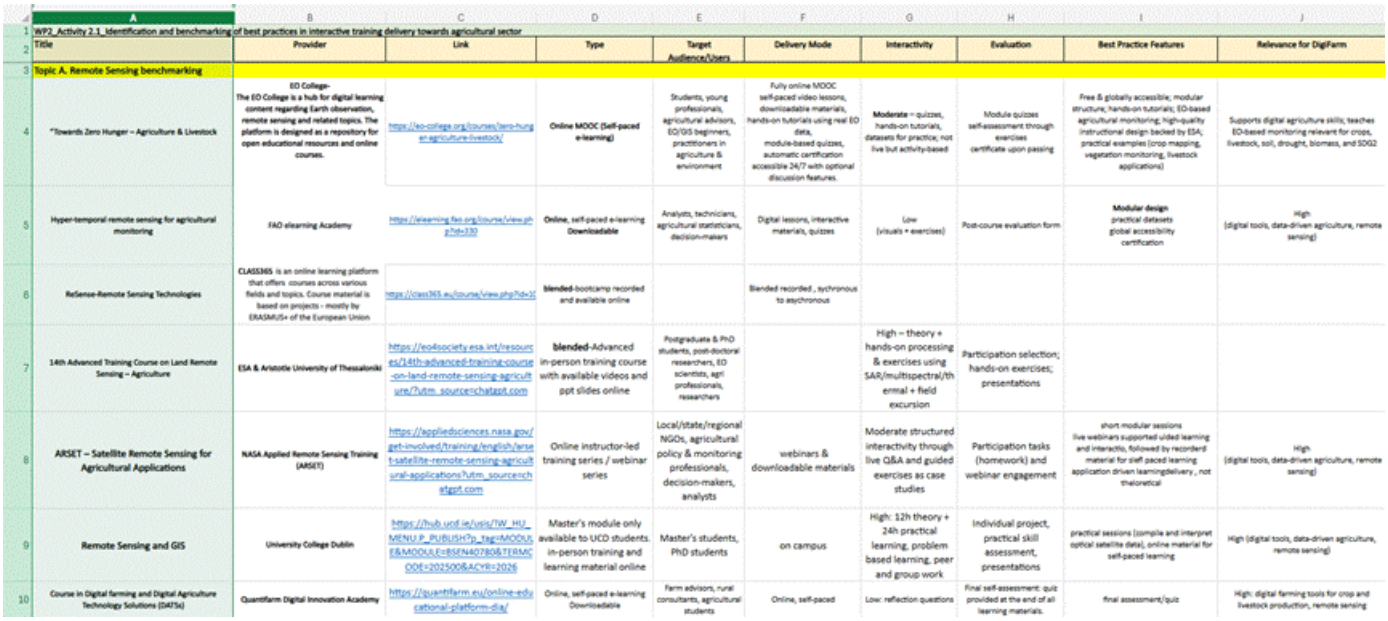
Recommended best practice	Recommended Implementation	Why it is selected
Open, Online delivery	All training delivered through Cultivate Academy	Scalable, cost-efficient, and accessible across countries
Asynchronous core learning	Self-paced modules, videos, datasets, quizzes	Enables multilingual delivery and flexible participation
Recorded expert input	Expert videos and recorded demonstrations	Provides guidance without requiring repeated live sessions
Modular micro-learning	Short units with progressive levels (introductory → advanced)	Supports heterogeneous advisor profiles
Case-based learning	Real farm, EO, smart-farming and sustainability examples of application	Increases relevance and professional usefulness
Interactive digital tools	Use of dashboards, datasets, smart-farming platforms	Builds operational advisory competences

Self-assessment quizzes	Knowledge checks and level progression	Supports flexible learning and quality assurance
Certification	Digital certificates upon successful completion	Motivates participation and provides formal recognition
Multilingual delivery	English, Greek and Italian content with subtitles	Enables national and pan-European reach
Learner tracking & feedback	Platform records and evaluation forms	Supports reporting, quality control and optimisation

5. Annex I – Benchmarking dataset

The complete benchmarking dataset used for this report is available in Microsoft Excel format at the projects shared folder below, along with indicative samples screenshots.

Activity 2.1_Benchmarking best practices in agriculture interactive trainings.xlsx



	A	B	C	D	E	F	G	H	I	J
1	WP2_Activity 2.1_Identification and benchmarking of best practices in interactive training delivery towards agricultural sector									
2	Title	Provider	Link	Type	Target Audience/Users	Delivery Mode	Interactivity	Evaluation	Best Practice Features	Relevance for DigiFarm
3	Topic A. Remote Sensing benchmarking									
4	"Towards Zero Hunger – Agriculture & Livestock	EO College- The EO College is a hub for digital learning content regarding Earth observation, remote sensing and related topics. The platform is designed as a repository for open educational resources and online courses.	https://eo-college.org/courses/zero-hunger-agriculture-livestock/	Online MOOC (Self-paced e-learning)	Students, young professionals, agricultural advisors, EO/GIS beginners, practitioners in agriculture & environment	Fully online MOOC self-paced video lessons, downloadable materials, hands-on tutorials using real EO data, module-based quizzes, automatic certification accessible 24/7 with optional discussion features.	Moderate – quizzes, hands-on tutorials, datasets for practice; not live but activity-based	Module quizzes self-assessment through exercises certificate upon passing	Free & globally accessible; modular structure; hands-on tutorials; EO-based agricultural monitoring; high-quality instructional design backed by ESA; practical examples (crop mapping, vegetation monitoring, livestock applications)	Supports digital agriculture skills; teaches EO-based monitoring relevant for crops, livestock, soil, drought, biomass, and SDG2
5	Hyper-temporal remote sensing for agricultural monitoring	FAO eLearning Academy	https://elearning.fao.org/course/view.php?id=330	Online, self-paced e-learning Downloadable	Analysts, technicians, agricultural statisticians, decision-makers	Digital lessons, interactive materials, quizzes	Low (visuals + exercises)	Post-course evaluation form	Modular design practical datasets global accessibility certification	High (digital tools, data-driven agriculture, remote sensing)
6	ReSense-Remote Sensing Technologies	CLASS365 is an online learning platform that offers courses across various fields and topics. Course material is based on projects - mostly by ERASMUS+ of the European Union	https://class365.eu/course/view.php?id=3	blended-bootcamp recorded and available online		Blended recorded , sychronous to asychronous				
7	14th Advanced Training Course on Land Remote Sensing – Agriculture	ESA & Aristotle University of Thessaloniki	https://eo4society.esa.int/resources/14th-advanced-training-course-on-land-remote-sensing-agriculture/?utm_source=chatgpt.com	blended-Advanced in-person training course with available videos and ppt slides online	Postgraduate & PhD students, post-doctoral researchers, EO scientists, agri professionals, researchers		High – theory + hands-on processing & exercises using SAR/multispectral/thermal + field excursion	Participation selection; hands-on exercises; presentations		
8	ARSET – Satellite Remote Sensing for Agricultural Applications	NASA Applied Remote Sensing Training (ARSET)	https://appliedsciences.nasa.gov/get-involved/training/english/arset-satellite-remote-sensing-agricultural-applications?utm_source=chatgpt.com	Online instructor-led training series / webinar series	Local/state/regional NGOs, agricultural policy & monitoring professionals, decision-makers, analysts	webinars & downloadable materials	Moderate structured interactivity through live Q&A and guided exercises as case studies	Participation tasks (homework) and webinar engagement	short modular sessions live webinars supported u/ded learning and interactio, followed by recorderd material for self paced learning application driven learningdelivery , not theloretical	High (digital tools, data-driven agriculture, remote sensing)
9	Remote Sensing and GIS	University College Dublin	https://hub.ucd.ie/usis/!W_HU_MENU.P_PUBLISH?p_tag=MODULE&MODULE=BSEN40780&TERMCODE=2025008ACYR=2026	Master's module only available to UCD students. in-person training and learning material online	Master's students, PhD students	on campus	High: 12h theory + 24h practical learning, problem based learning, peer and group work	Individual project, practical skill assessment, presentations	practical sessions (compile and interpret optical satellite data), online material for self-paced learning	High (digital tools, data-driven agriculture, remote sensing)
10	Course in Digital farming and Digital Agriculture Technology Solutions (DATSs)	Quantifarm Digital Innovation Academy	https://quantifarm.eu/online-educational-platform-dia/	Online, self-paced e-learning Downloadable	Farm advisors, rural consultants, agricultural students	Online, self-paced	Low: reflection questions	Final self-assessment: quiz provided at the end of all learning materials.	final assessment/quiz	High: digital farming tools for crop and livestock production, remote sensing

Figure 1. Topic A-Remote Sensing trainings benchmarking

WP2_Activity 2.1_Identification and benchmarking of best practices in interactive training delivery towards agricultural sector

Topic B. Tools and data for smart farming:

#	Topic	Provider	Link	Type	Users	Delivery Mode	Interactivity	Evaluation	Best Practice Features	Relevance for DigiFarm
13	E-Learning on Digital Agriculture"	World Bank Group Academy	e-Learning on Digital Agriculture	Online e-learning, self-paced (~15 hrs)	Policy makers, agricultural advisors, development practitioners, agri-SMEs, students, project managers	Online, asynchronous; modular lessons with videos, readings, and examples	Low–Moderate – videos, reflection exercises, short quizzes	Knowledge checks and course completion certificate	Structured overview of Digital Agricultural Technologies (DATs); policy-to-practice perspective; real-world case studies; globally accessible; self-paced learning	High – bridges digital farming tools, ICT adoption, and real agricultural transformation use cases
14	IoT field sensor platform for soil moisture, temperature, and nutrient monitoring.	CropX Platform	https://cropx.com/	Commercial platform combining in-field sensors with cloud analytics dashboard.	Farmers, agronomists, cooperatives, irrigation managers	Online dashboard and mobile app with optional on-farm installation support	High? (users configure zones, thresholds, and view real-time sensor maps and alerts)	Monitor reductions in water use etc	Site-specific irrigation recommendations, historical data analysis, integration with variable-rate irrigation systems	calibration and validation of moisture and stress maps?? NOT SURE
15	IoT soil and climate sensor platform	Agricolus Professional Academy	https://www.agricolus.com/en/?_gl=1%2A1[illegible]	Commercial smart-farming decision-support system combining sensors, models, and remote sensing	Farmers, agronomists, cooperatives, advisory services.	Cloud platform and mobile app with online documentation and webinars.	High; dashboards, alerts, prescription maps, and configuration of fields and crops	Track input savings, yield changes, and reduced general losses	forecast models, smart pest and disease warnings, remote sensing layers	tool that is easy that anyone can use and I think is free
16	xFarm – digital farm management and precision agriculture platform.	XFarm platform Academy	https://www.xfarm.ag/en	Commercial farm management information system	Medium and large farms, cooperatives, agronomists, agri-food companies.	Cloud platform and mobile app, with online support and documentation.	High; users map fields, connect sensors and machinery, plan operations, and view performance dashboards.	Ground data also		
17	ITFARM Master Course in Digital Farming- Modules & Case Studies in Digital Agriculture	Erasmus IT Farm project open platform	https://itfarm.trebag.hu/	online available training materials in Moodle platform and demo website	Farmers	online, asychronous	low, national communication channels provided by FB groups	Only self quiz available in website, tailoer ot section/level. No attendence required in the website, only in Moodle	1. modular design: content tailored to 3 levels(informative, basic, master). This was done by providing material in separate topics (Basics, tech solutions, Data collection) 2. Showcasing multiple case studies + videos 3. Used both moodle and demo website for easy access 4. self quiz for each level/section. (No requirment of attendence in the website, no certificate provided)	relevent project on VET , Under same Erasmus KA220, call: Master Course in Digital Farming IT Farm's Master Level course offers 34 modules covering a diverse range of topics, from the use of drones to soil sampling, plant protection sensors to precision argonomics, and so much more.
18	Course in Digital farming and Digital Agriculture Technology Solutions (DATSs)	Quantifarm Digital Innovation Academy	https://quantifarm.eu/online-educational-platform-dia/	Online, self-paced e-learning Downloadable	Farm advisors, rural consultants, agricultural students	Online, self-paced	Low: reflection questions	Final self-assessment: quiz provided at the end of all learning materials.	final assessment/quiz	High: digital farming tools (sensors, UAVs, UGVs, satellites), Variable Rate Technologies, DSS, case studies

Figure 2. Topic B-Digital Tools and Data for smart farming trainings benchmarking (part A)

WP2_Activity 2.1_Identification and benchmarking of best practices in interactive training delivery towards agricultural sector

#	Title	Provider	Link	Type	Target Audience/Users	Delivery Mode	Interactivity	Evaluation	Best Practice Features	Relevance for DigiFarm
19	IoT and cloud platforms in AgriFood Prod	University College Dublin	https://hub.ucd.ie/usis/!W_HU_MENU.P_PUBLISH?p_tag=MODULE&MODULE=BSEN40750&TERMCODE=202500&ACYR=2026	module (master's program) for students	Master's students, PhD students	blended	High: presentations, tutorials, computer-aided labs,	Assignments (including essays, reports, setting up Arduino IoT Edge Device, in-field deployment and testing of IoT soil sensors)	implementation and demonstration of students' own virtual IoT sensor agricultural smart application	High: digital farming tools (IoT sensors, IoT cloud platforms and their applications in agriculture, Proximal sensing, IoT decision support)
20	Precision Agriculture and Smart Farming	AION Academy	https://www.aionacademy.online/course/precision-agriculture-smart-farming	online e-learning course	farmers, farm advisors, rural consultants, agricultural students	Online, self-paced	High: videos, practical exercises, quizzes for self assessment	self-assessment quiz at the end of each section	Modular structure, case studies, self-assessment quiz, Certificate of completion	High: digital agriculture technologies (GPS, GIS, drones, robotics), data management skills, case studies
21	Introduction to Climate-Smart Agriculture	Food and Agriculture Organization of the United Nations – FAO eLearning Academy	https://elearning.fao.org/course/view.php?id=439	online e-learning course	Policy makers, development practitioners, trainers, extension agents	Online, asynchronous	Quizzes & self-paced modules	Self-evaluation & course feedback	Global public good, accessible; Clear structure on CSA concepts & adaptation strategies; Free and widely referenced	Medium-High — foundational content for sustainability & climate resilience
22	Climate-Smart Crop Production	Food and Agriculture Organization of the United Nations – FAO eLearning Academy	https://sdghelpdesk.unescap.org/e-learning/fao-climate-smart-agriculture-e-learning-courses?utm_source=chatgpt.com	Online e-learning course	Agricultural practitioners, extension agents, educators	Online, self-paced	Quizzes & case reading	Self-assessment & content exploration	Practical focus on crop systems; Climate adaptation & mitigation insights	Medium — links climate resilience with production systems
23	The Future of Farming: Exploring Climate-Smart Agriculture	FutureLearn	https://www.futurelearn.com/courses/climate-smart-agriculture	Online short course	Anyone interested in CSA, farmers, students	Online, weekly modules	Peer discussions, comments & assignments	Optional certificate (paid) feature	Social learning via peer engagement; Integrates climate, sustainability and food system context	Medium
24	Summer School Intelligent Agriculture	Wageningen University & Research – Wageningen Academy	https://www.wur.nl/en/education/for-professionals/programmes-and-courses/summer-school-intelligent-agriculture	On-campus summer school	Bachelor/Master students, early-career researchers, professionals	In-person (includes workshops & field visits)	Workshops; Field visits; Group project & presentations	Capstone project & participation	Deep immersion with hands-on practice; AI, IoT & big data labs; Industry-academic integration	High
25	Precision Agriculture	Purdue University – eLearning Academy	https://ag.purdue.edu/department/agry/elearning-academy/precision-agriculture.html	Online 12-week non-credit course	Agricultural professionals, farmers, extension educators, advisors	100% online, self-paced	Video lessons, supplemental reading, downloadable slides, tests	Module tests	Comprehensive precision ag content; Mixed media (video + text + quizzes); Professional-oriented delivery	High
26	IoT Enabled Farming	Coursera	https://www.coursera.org/learn/iot-enabled-farming?utm_source=chatgpt.com	Online course	Farmers, agri-professionals, tech adopters, students	Online	Quizzes	Course assessments	Direct focus on IoT tech in agriculture; Skills on sensor networks & data use	Very High

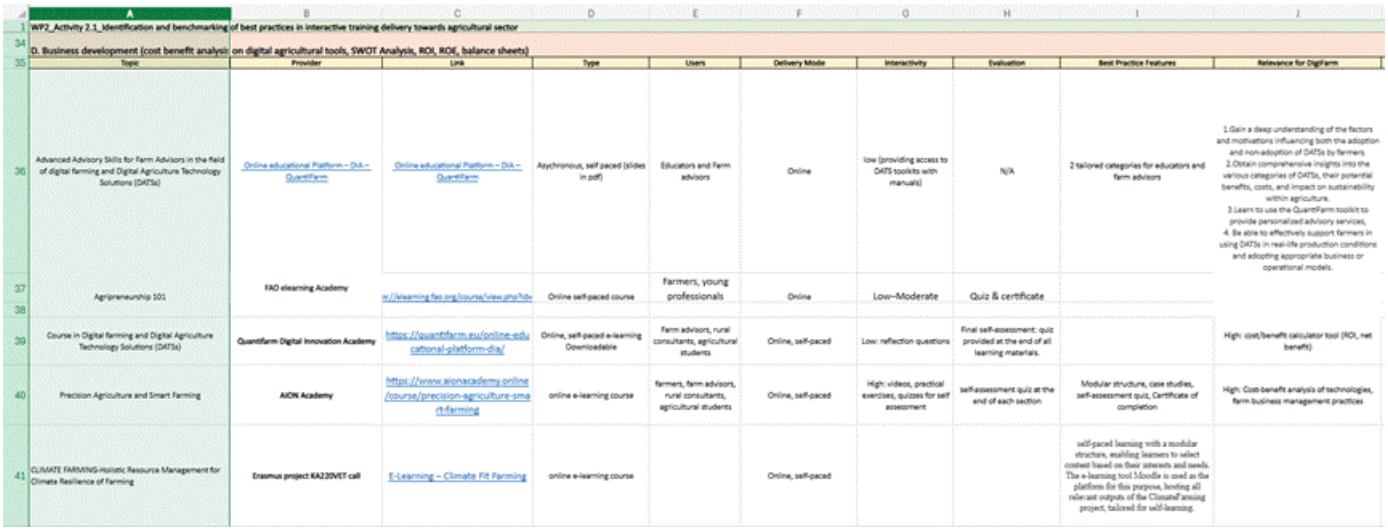
Figure 3. Topic B-Digital Tools and Data for smart farming trainings benchmarking (part B)

WP2_Activity 2.1_Identification and benchmarking of best practices in interactive training delivery towards agricultural sector

Topic C. Green and soft skills: Communication with farmers, ESGs, EFRAG sustainability standards, circular economy principles);

#	Topic	Provider	Link	Type	Users	Delivery Mode	Interactivity	Evaluation	Best Practice Features	Relevance for DigiFarm
29	EFRAG Sustainability & ESRS Standards	EFRAG Knowledge Hub EFRAG is a private association established in 2001 with the encouragement of the European Commission to serve the public interest. EFRAG extended its mission in 2022 following the new role assigned to EFRAG in the CSRD, providing Technical Advice to the European Commission in the form of draft European Sustainability Reporting Standards and/or draft amendments to these Standards.	https://knowledgehub.efrag.org/eng	Webinars / Guidelines	Policy makers, Consultants, Agri-SMEs	Online	Low-Medium	Attendance / knowledge check		Reference material + awareness sessions
30	Circular Economy Principles in Agriculture	The Ellen MacArthur Foundation	https://www.ellenmacarthurfoundation.org/	Online/ there are podcasts, videos, articles etc	Farmers, Advisors, Students	Online	I think there are inerctive exercises	Not sure		Linked to sustainable practices
31	Circular BioEconomy Principles	University College Dublin	https://hub.ucd.ie/usis/!W_HU_MENU.P_PUBLISH?p_tag=MODULE&MODULE=BSEN30650	Online module	students	Online	medium: group work assignment, group-based hands-on learning involving problem-solving activities	Group work assignment, individual projects	Industry case studies (e.g. agrifood)	Circular bioeconomy principles
32	[illegible]ding a Hungry Planet: Agriculture, Nutrition and Sustainal[illegible]	SDG Academy	https://sdgacademy.org/course/feeding-a-hungry-planet-agriculture-nutrition-and-sustainability/?utm_source=chatgpt.com	Open Online Course	[illegible]tural learners, sustainabil[illegible]	Online instructional modules	Quizzes	Self-paced assessment components	Global development perspective; Integration of sustainability with agricultural systems	Medium-High;useful for sustainability, food systems and farm context modules
33	Introduction to Circular Agriculture (Digital Course in Cir[illegible]	Erasmus+ KA220-HED Project – Dir[illegible]	https://eclass.aegean.gr/courses/FNS-OTHER164/	Open Online Course	Students, academics	[illegible]ully online, asynchronous, modul[illegible]	[illegible]xperiential learning, "artfu[illegible]	Self-evaluation question[illegible]	Erasmus+ quality assurance and pedagogical design	literacy, sustainability communication, ESG-related thinking, and advisory skills for green transition in agriculture

Figure 4. Topic C-Green and Soft Skills trainings benchmarking



	A	B	C	D	E	F	G	H	I	J
1	WP2_Activity 2.1_Identification and benchmarking of best practices in interactive training delivery towards agricultural sector									
34										
35	D. Business development (cost benefit analysis on digital agricultural tools, SWOT Analysis, ROI, ROE, balance sheets)									
	Topic	Provider	Link	Type	Users	Delivery Mode	Interactivity	Evaluation	Best Practice Features	Relevance for DigiFarm
36	Advanced Advisory Skills for Farm Advisors in the field of digital farming and Digital Agriculture Technology Solutions (DATSs)	Online educational Platform – DIA – QuantiFarm	Online educational Platform – DIA – QuantiFarm	Asychronous, self paced (slides in pdf)	Educators and Farm advisors	Online	low (providing access to DATS toolkits with manuals)	N/A	2 tailored categories for educators and farm advisors	1.Gain a deep understanding of the factors and motivations influencing both the adoption and non-adoption of DATSs by farmers. 2.Obtain comprehensive insights into the various categories of DATSs, their potential benefits, costs, and impact on sustainability within agriculture. 3.Learn to use the QuantiFarm toolkit to provide personalized advisory services, 4. Be able to effectively support farmers in using DATSs in real-life production conditions and adopting appropriate business or operational models.
37	Agripreneurship 101	FAO elearning Academy	n://elearning.fao.org/course/view.php?id=	Online self-paced course	Farmers, young professionals	Online	Low–Moderate	Quiz & certificate		
38										
39	Course in Digital farming and Digital Agriculture Technology Solutions (DATSs)	Quantifarm Digital Innovation Academy	https://quantifarm.eu/online-educational-platform-dia/	Online, self-paced e-learning Downloadable	Farm advisors, rural consultants, agricultural students	Online, self-paced	Low: reflection questions	Final self-assessment: quiz provided at the end of all learning materials.		High: cost/benefit calculator tool (ROI, net benefit)
40	Precision Agriculture and Smart Farming	AION Academy	https://www.aionacademy.online/course/precision-agriculture-smart-farming	online e-learning course	farmers, farm advisors, rural consultants, agricultural students	Online, self-paced	High: videos, practical exercises, quizzes for self assessment	self-assessment quiz at the end of each section	Modular structure, case studies, self-assessment quiz, Certificate of completion	High: Cost-benefit analysis of technologies, farm business management practices
41	CLIMATE FARMING-Holistic Resource Management for Climate Resilience of Farming	Erasmus project KA220VET call	E-Learning – Climate Fit Farming	online e-learning course		Online, self-paced			self-paced learning with a modular structure, enabling learners to select content based on their interests and needs. The e-learning tool Moodle is used as the platform for this purpose, hosting all relevant outputs of the ClimateFarming project, tailored for self-learning.	

Figure 5. Topic D –Business development Skills trainings benchmarking