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Deliverable 2. Environmental Protection and Green Economy Shifting Teachers' Competencies Report

INTERNATIONAL REPORT



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Introduction

This international report is a part of the WP2 Consolidation of Knowledge – A2. It synthesises the key findings from national surveys conducted in Italy, Bulgaria, Romania, and Turkey as part of the GreenTeach project.

The GreenTeach project, under the Erasmus+ Programme, aims to transform teaching into a greener planet by bridging the gap in green skills and enhancing sustainable training options within Technical and Vocational Education and Training (TVET) institutions. A central component of this endeavour is to improve the competencies of VET educators in environmental protection and the green economy, aligning with European frameworks and enabling them to create inclusive green learning scenarios using modern technology and innovative teaching methods.

To effectively address these goals, national reports were developed based on online questionnaires administered to VET teachers in each participating country. These surveys sought to understand educators' current awareness of sustainability frameworks, particularly the GreenComp framework, their confidence in teaching sustainability-related topics, their utilisation of various pedagogical approaches and digital tools, and crucially, their identified training needs and preferences in sustainability education.

This international report will draw upon the wealth of data collected through these national surveys to provide a comparative overview of the findings across the four countries. It will explore the common themes and unique perspectives that have emerged regarding teachers':

- Demographic profiles.
- Awareness and understanding of sustainability frameworks such as GreenComp and green standards
- Current teaching methodologies and pedagogical approaches to sustainability
- Digital competencies and the use of technology for sustainability education
- Training needs and preferences concerning format and subject matter
- Additional suggestions and comments provided by educators regarding their training needs.

By synthesising these national perspectives, this report provides valuable insights into the shared challenges and opportunities in equipping TVET educators across Europe with the necessary competencies to foster sustainability education. Ultimately, this discussion will inform the development of effective training initiatives and contribute to fostering a more sustainable future through vocational education and training.



1. A Methodological Overview of the Training Needs Assessment

This international report on VET teachers' training needs for sustainability education within the GreenTeach project is underpinned by data gathered through a structured online questionnaire (ANNEX 1). This methodological explanation will introduce the questionnaire, explain its purpose, show its structure, and detail its content to provide a comprehensive understanding of the data collection instrument.

The GreenTeach project aims to promote environmental sustainability and combat climate change by enhancing green and sustainable training options in Vocational Education and Training (VET) institutions. A key aspect of this project is to improve the skills of VET educators in environmental protection and the green economy, aligning with European frameworks. To achieve this, it was crucial to understand the existing competencies, awareness, and training needs of VET teachers across participating countries, including Italy, Bulgaria, Romania, and Turkey.

The questionnaire's primary purpose was to assess VET teachers' training needs concerning sustainability competencies and green skills. Specifically, the questionnaire aimed to:

- Evaluate teachers' awareness and understanding of sustainability frameworks, particularly the GreenComp framework.
- Gauge their confidence in applying various teaching methodologies relevant to sustainability education.
- Assess their digital competencies and use of technology in developing educational resources related to sustainability.
- Identify their preferred training needs and formats for professional development in sustainability education.
- Gather additional suggestions and comments regarding training needs for sustainability education.

The questionnaire was structured into six distinct sections to gather this information systematically:

- Section 1: Demographic Information: This section collected data on the teachers' age, gender, country of teaching, area of expertise/specialisation, years of experience in teaching VET subjects, and the subjects they teach. The question types used in this section were primarily multiple choice and short answer.
- Section 2: Awareness and Understanding of Sustainability Frameworks: This section explored teachers' familiarity with the GreenComp framework (Question 6), their confidence in understanding its key sustainability competencies (Question 7), their familiarity with European and international green and sustainable management standards (Question 8), their familiarity with green standards in their specific sector



(Question 9), whether they incorporate sustainability-related topics into their teaching (Question 10), and how important they consider integrating sustainability competencies into their VET curriculum (Question 11). Finally, it included a table (Question 12) asking for opinions on designing, developing, and providing learning pathways for various sustainability competencies, using multiple-choice options for each competence.

- Section 3: Teaching Methodologies and Pedagogical Approaches: This section assessed teachers' confidence in applying various teaching methodologies such as Problem-Based Learning (PBL), Inquiry-Based Learning, Experiential Learning, Design Thinking, and the Micro-Learning Approach (Question 9). It also asked which teaching methods they find most effective for teaching sustainability competencies (Question 10), whether they had received formal training in these methodologies (Question 11), and their interest in receiving training on these methodologies (Question 12).
- Section 4: Digital Competencies and Use of Technology: This section explored teachers' confidence in using digital tools and technologies to develop sustainable educational resources (Question 13). It then asked which digital tools and technologies they are comfortable using (Question 14) and their interest in receiving training in the use of new technologies for developing educational resources (Question 15).
- Section 5: Training Needs and Preferences: This section focused on identifying the type of training teachers would find most beneficial (Question 16) and their preferred topics for professional development (Question 17).
- Section 6: Additional Comments: This final section provided an open space for teachers to offer suggestions or additional comments regarding training needs for sustainability education (Question 18).

The data collected through this questionnaire provides a rich source of information for understanding the training needs of VET teachers in the context of sustainability education across the four participating countries. The analysis of these responses forms the basis for the findings and conclusions presented in this report, ultimately aiming to inform the development of effective professional development initiatives within the GreenTeach project.



2. GreenTeach Findings Overview

2.1 Demographic Profiles

The demographic data gathered from the online surveys across Bulgaria, Italy, Romania, and Turkey provide a detailed and multifaceted profile of 204 VET educators. Regarding age distribution, most respondents fall within the 35–54 age range, as shown in the following graphics.



Figure 1 – Age Distribution of Respondents (Total 204)

Specifically, 15 participants (20.8%) are aged 35–44 and 25 (34.7%) aged 45–54 in Italy; in Bulgaria, both groups represent 30% each; in Romania, 16.7% are 35–44 and 25% are 45–54; and in Turkey, 36.3% are 35–44 while 57.5% are 45–54. Other age groups are less represented: those aged 25–34 account for 5.6% in Italy, 8.3% in Romania, and 3% in Turkey; those 55–64 make up 36.1% in Italy and 47.2% in Romania, while the 65+ age group is minimally represented (2.8% in Italy, 3% in Bulgaria, and present in Romania). These figures suggest a predominantly mature and experienced cohort.

Gender distribution indicates a significant female majority in most countries: 80.6% in Italy, 68% in Bulgaria, 86.1% in Romania, and 51.6% in Turkey. Male respondents range from 13.9% to 48.4%, with a small portion (2.8%) in Italy preferring not to disclose their gender.

The data showcases that female educators represent a significant majority, which inevitably may influence the teaching approaches and perspectives shared within the survey.

The teaching experience of respondents spans from early-career educators to seasoned professionals, as shown in the figure below:





Figure 2 – Teaching Experience of Respondents (Total 204)

In Italy, 34.7% have less than 5 years, 12.5% have 5–10 years, 13.9% each have 10–15 and 15–20 years, and 25% have over 20 years of experience. In Bulgaria, 23.8% have less than 5 years, 14.3% have 5–10 years, 19% each have 10–15 and 15–20 years, and another 23.8% exceed 20 years. Romania shows a majority (47.2%) with over 20 years, while the fourth survey reflects 48.5% with over 20 years, 21.3% each for 5–10 and 10–15 years, and only 6% with less than 5 years. These figures confirm that the sample is heavily weighted toward veteran educators with a depth of experience in teaching.

Across the surveys, respondents report diverse areas of specialisation, as shown in Table 1. Prominent fields include Sciences and Technology (Italy 19.4%, Romania 19.4%), Education and Teaching (Italy 18.06%, Romania 58.34%), and Economics and Administration (Italy 15.28%, Romania 5.56%, fourth country 27.3%). Additional areas include Tourism and Sustainability, Literature and Humanities, Inclusion and Support, Health and Socio-Healthcare, Renewable Energy, Manufacturing, ICT, Agriculture, and Other interdisciplinary domains. Bulgaria notably features electronics, ICT, healthcare, and energy supply among its top disciplines, while Romania lists a detailed breakdown of biology (16.7%), physics (16.7%), chemistry, mathematics, and tourism.



Table 1 – Area of Specialisations

CATEGORY	NUMBER OF MENTIONS	PERCENTAGE
Commerce/Management	9	4,41%
Sciences and Technology	21	10,29%
Information Technologies	10	4,90%
Education and Teaching	36	17,65%
Manufacturing	7	3,43%
Early School	1	0,49%
Mathematics	1	0,49%
Physic	1	0,49%
Technical Mechanics	1	0,49%
Furniture	1	0,49%
Economics and Administration	29	14,22%
Literature and Humanities	6	2,94%
Health and Socio-Healthcare	12	5,88%
Inclusion and Support	6	2,94%
Agriculture	3	1,47%
Tourism and Sustainability	18	8,82%
Electronics, Microelectronics, and Electrotechnics	12	5,88%
Other Areas (e.g. Waste and Environmental Management, Renewable Energy, Emerging Technologies, Philosophy/Pedagogy/Psychology)	30	14,71%

In terms of subjects taught, respondents cover a broad spectrum. In Italy, major domains include Sciences (23.61%), Support Education (22.22%), and Economics and Law (18.06%). In Bulgaria and Turkey, subjects include Mathematics and IT, Technical Sciences (e.g., Electronics, Mechanics, and Materials Science), Business and Administration, Healthcare, and specialised areas like Tourism, Renewable Energy, and Agriculture. Romania presents a similarly broad scope, including Biology, Physics, Chemistry, Trade, and ICT. Many educators report alignment between their areas of specialisation and the subjects they teach. However, some teach outside their immediate field, especially those in inclusion, education, and psychology, and they often work in broader support roles.

The subjects taught by respondents are categorised by domain in the following table:



Table 2 – Subjects taught by respondents

Domain	Subjects
Mathematics and IT	Mathematics, informatics, IT, Information technology, Computer systems, Programming, Computer networks, Microprocessor technology, Applied Software, Design, Embedded microcomputer systems, Sensors and sensor systems, Microcontroller programming, Embedded microcomputer systems programming, System administration internship
Sciences	Sciences, Biology, Physics, Chemistry
Technical Sciences	Electronics, Electrical engineering, Electrical equipment, building elements in electronics, technical drawing, technical mechanics, OHS, Materials science, Electrical machines, Electrical equipment, Specialty internship, Special measurements internship, Electrical and electronic measurements internship, Internal combustion engines, Diagnostics, ATT, CNC MM, EMMS, MEIP, MIP, Diagnostics and control, Automation
Business/Administration and Economics	Economics and economic disciplines, Marketing, Economics and organisation of a commercial enterprise, Economics and Law, Accounting, Enterprise accounting, General theory of accounting, Trade
Tourism	Tour Guiding and Tourist Animation, Hospitality in the Tourism Industry, Additional Activities in Tourism, Entrepreneurship, Tourism Management
Healthcare	Drug Technology with Biopharmacy, Physiotherapy, Kinesitherapy, Teaching and Laboratory Practice, Social Medicine and Health Promotion, Rehabilitation, Medico- Social Prevention, Medical Ethics, Sociology, Medical Statistics, Stress and Health, Pharmaceutical Marketing
Agriculture	Botany, Organic Plant Production, Chemistry and Environmental Protection
Other	Languages, Aviation technology, Support Education, Inclusion, Education, and Psychology



The questionnaire reveals a strong alignment between educators' specialisations and the subjects they teach, particularly in areas such as tourism, informatics, chemistry, law, languages, mathematics, and technical sciences. However, some discrepancies emerge: professionals in inclusion, psychology, and education are often assigned to support roles, while those with degrees in political science or educational studies may teach subjects not directly related to their background. Demographic data shows the most experienced female educators from across Italy, representing a variety of fields. Their diverse backgrounds and expertise offer valuable insights into future professional development, especially in the context of educational sustainability.

2.2 Awareness and Understanding of Sustainability Frameworks

The survey provides valuable insights into educators' understanding and application of sustainability frameworks, specifically the GreenComp framework. The survey data reflects their familiarity, confidence levels, integration of sustainability topics into teaching, and the perceived importance of sustainability in education.

The survey reveals a range of familiarity levels among educators regarding the GreenComp framework.

While the largest group of respondents (44.6%) reported being *moderately familiar*, a significant portion indicated limited knowledge, with 23.53% *slightly familiar* and 18.55% *not at all familiar*. Only 12.26% described themselves as very familiar, and a mere 1.08% as extremely familiar. As shown in the following figure, these results highlight a clear need for increased awareness and professional development to support educators in effectively engaging with and applying the GreenComp framework in their teaching practices.



Figure 3 – Familiarity with the GreenComp Framework (European Sustainability Competence Framework)



When assessing confidence levels in understanding the key competencies outlined in the GreenComp framework, the results indicate a moderate level of confidence, as shown in the figure below, in understanding the key sustainability competencies outlined in the GreenComp framework. The largest share of participants (38.24%) described themselves as moderately confident, suggesting a partial but incomplete grasp of the framework. Meanwhile, 20.59% felt *confident* and 13.24% *very confident*, totalling roughly a third of respondents who expressed a strong confidence level. However, 15.69% reported not feeling confident, and 12.25% *not at all confident*, highlighting a significant portion of educators who may require further support and training. These results underscore the importance of reinforcing teacher development initiatives to deepen understanding and enhance the integration of sustainability competencies in education.



Figure 4 – The confidence in understanding the key sustainability competencies outlined in GreenComp

The survey also evaluated educators' knowledge of green standards and sustainable management practices (e.g., ISO 14001, EMAS, SDGs). As shown in the figure below, the results reveal that overall familiarity among the 204 respondents is relatively low. While 27.4% reported being *moderately familiar* and 12.3% *very familiar*, most participants fall into the less familiar categories, with 34.8% *slightly familiar* and 24.5% *not at all familiar*. Only 1% of respondents consider themselves *extremely familiar* with these standards. This suggests that while there is some awareness, most educators have limited knowledge of key green and sustainability standards, pointing to a clear opportunity for capacity-building and training in this area.





Figure 5 – The grade of familiarity with the green standards and sustainable management practices

This distribution suggests a mix of knowledge levels, with many educators still needing exposure to relevant standards and practices.

As shown in the following figure regarding integrating sustainability-related topics into one's teaching practices, the responses indicate a positive trend toward integrating sustainability in education.



Figure 6 – The integration of the sustainability-related topics into teaching practices

Most respondents (79.41%) report already doing so, with 28.91% incorporating such topics regularly and 50.50% doing so occasionally. This suggests a strong existing interest and engagement among educators.



Additionally, 10.77% plan to include sustainability topics in the future, signalling further potential growth. Only 9.82% of participants currently do not incorporate these themes, highlighting that while there is room for improvement, the overall outlook encourages promoting sustainability education.

The data reveals a strong consensus on the importance of integrating sustainability skills into professional training curricula.

Across all four countries surveyed, Italy, Bulgaria, Romania, and Turkey, VET educators have a clear and consistent consensus on the importance of integrating sustainability competencies into vocational education and training (VET) curricula. In Italy, respondents overwhelmingly rated sustainability integration as *important* or *sufficiently important*, highlighting broad recognition of its relevance in professional development. Similarly, while precise figures from Bulgaria were not detailed, responses reflect strong support for embedding sustainability in training programs. In Romania, nearly 81% of educators rated this integration as *important* or *very important*, reinforcing the significance attributed to sustainability education. In Turkey, most respondents selected the highest ratings on the importance scale, with over 60% choosing 4 or 5 out of 5, and only a small minority dismissing its importance. Collectively, the data reveals a strong regional alignment on the growing need to equip learners with sustainability competencies, positioning them for future-oriented, responsible professional practices.

As to the multidimensional inquiry, welcoming respondents to provide an opinion regarding the design, development and delivery of learning pathways that develop the respective sustainability skills in VET students, most teachers have expressed interest towards every single skill accompanied by different combinations of replies spanning varying levels of confidence and predisposition to a topic.

In detail:

- In Italy, educators expressed high interest in developing every sustainability skill, with over 80% indicating interest in topics like sustainability evaluation. However, only around 10% felt confident in their ability to design or create learning pathways for these competencies. While competencies such as systems thinking, adaptability, critical thinking, future literacy, and collective action garnered widespread support, some respondents reported unfamiliarity with certain topics, highlighting a need for introductory training. Notably, only one or two teachers expressed no interest, underscoring sustainability's broad relevance in the Italian VET context.
- In Bulgaria, interest levels were similarly high, particularly for systems thinking (76%), critical thinking (70%), exploratory thinking (73%), problem framing (73%), futures literacy (73%), and adaptability (73%). Despite this enthusiasm, fewer educators felt confident in implementing these competencies. For example, while 43% felt capable of promoting nature, only 35% felt confident in fostering individual initiative or supporting fairness. Additionally, 11% and 16% of respondents admitted unfamiliarity with adaptability and valuing sustainability, respectively, indicating some knowledge gaps. These results suggest that while a strong desire exists to teach sustainability.



related skills, further professional development and support are required to build implementation confidence.

- In Romania, the trend was consistent with that of the other countries, with 100% of respondents expressing interest in developing sustainability competencies at all educational levels. High levels of interest were recorded for valuing sustainability (over 70%), supporting fairness and adaptability (over 66%), and over 50% for other competencies such as political agency, collective action, systems thinking, and critical thinking. However, confidence levels were much lower in comparison: for instance, while 72.22% were interested in valuing sustainability, only 22.22% believed they could effectively create and implement related learning experiences. This discrepancy points to a motivated educator base lacking the tools, training, or institutional support to turn their interest into action.
- In Turkey, the survey showed particularly strong interest in competencies like critical thinking and collective action (66.7% each), systems thinking and political agency (63.6%), and futures literacy (60.6%). Despite this interest, confidence in implementing these competencies was lower, with the highest levels seen for adaptability (42.4%) and valuing sustainability (21.2%). Many Turkish educators also reported unfamiliarity with key competencies such as problem framing (45.5%), exploratory thinking (36.4%), and individual initiative (36.4%), suggesting significant gaps in familiarity with the GreenComp framework and related sustainability standards.

The following table presents a synthesis of the relative interest and familiarity levels across the 12 sustainability competencies: Valuing sustainability, Supporting fairness, Promoting nature, Systems thinking, Critical thinking, Problem framing, Futures literacy, Adaptability, Exploratory thinking, Political agency, Collective Action, and Individual initiative.

This table helps identify priority areas for training—highly valued competencies but where confidence in creating/developing is low—and where awareness raising is needed due to unfamiliarity.



Table 3 – Priori	ity areas for training-	- competencies
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Compotonco	I am interested to	I am not familiar	l Can
Competence	develop	with the topic	Create/Develop"
Valuing sustainability	Romania, Bulgaria, Turkey	Bulgaria Romania	Romania, Turkey
Supporting fairness	Romania, Bulgaria		Bulgaria
Promoting nature	Italy, Bulgaria, Romania		Bulgaria, Italy
Systems thinking	All countries		Generally low
Systems trinking	All countries		across all countries
Critical thinking	All countries		Generally low
	All countries		across all countries
Broblem framing	Italy Bulgaria	Turkov	Generally low
		Типкеу	across all countries
Eutures literacy	All countries		Generally low
	All countries		across all countries
Adaptability	Romania Bulgaria	Bulgaria Italy	Turkey – High
			interest
Exploratory thinking	Bulgaria	Turkov	Generally low
	Duigaria	Типкеу	across all countries
Political agency	Domania Turkov		Generally low
			across all countries
Collective action	Bomania Turkey		Generally low
			across all countries
Individual initiative	Romania, Bulgaria	Turkey	Bulgaria

Legend:

- Under "*I am interested to develop*" means it was frequently rated as a top area of interest in at least one country.
- A competence is included under "*I am not familiar with the topic*" if unfamiliarity was explicitly noted by 10%+ of respondents in any country.
- "*I am not interested in the topic*" was rarely mentioned, as interest was generally high overall; however, competencies not consistently marked high across countries were left blank in that column to indicate comparatively lower—but not absent—interest.
- "*I Can Create/Develop*" means that the educators felt confident in their ability to teach or build learning pathways for competence.
- "Generally low" = Not specified or relatively few respondents expressed confidence.

Across all four countries, VET educators exhibit a strong and growing awareness of the importance of sustainability in education and a willingness to foster related competencies in students. However, there is a consistent gap between this interest and educators' confidence or familiarity in implementing such topics. These findings highlight a critical need for structured professional development, clearer guidance, and accessible resources to empower educators to integrate sustainability competencies in line with the GreenComp framework effectively.



2.3 Current Teaching Methodologies and Pedagogical Approaches

Regarding the preferred teaching methodologies and pedagogical approaches, the respondents exhibit varied levels of confidence in using active and innovative teaching methodologies, reflecting both shared trends and country-specific patterns.

- In Italy, confidence was highest for Experiential Learning, where most responses clustered at the top of the confidence scale, suggesting familiarity and routine use. Inquiry-Based Learning also showed strong confidence, though slightly below Experiential Learning, with a significant number of teachers selecting 4 or 5 on the scale. Problem-Based Learning (PBL) had a more polarised distribution—many teachers felt very confident, but there was also a noticeable portion with low confidence, indicating a divide in implementation skills. In contrast, Design Thinking and Microlearning received lower confidence scores, possibly due to these being relatively newer or more niche methods, highlighting the need for further professional development.
- In Bulgaria, educators demonstrated the strongest confidence in Project-Based Learning (40% confident, 24% very confident) and Inquiry-Based Learning (41% confident, 21% very confident), showing alignment with more established, interactive teaching strategies. However, confidence dropped significantly for Experiential Learning and Design Thinking, with 19% and 33% respectively indicating uncertainty or low confidence. Microlearning was the least familiar and confidently applied approach in Bulgaria, with 57% of respondents stating they were not confident and only 5% saying they could use it effectively. This suggests a clear gap in exposure and training for newer methodologies.
- In Romania, the data reflected a generally high level of self-assurance in applying a range of methodologies. Inquiry-Based Learning stood out as the top method, with 55.55% of teachers feeling "very confident" and 16.66% "confident." Experiential Learning also ranked high (50% very confident, 25% confident), followed by Problem-Based Learning (38.88% very confident, 25% confident). However, confidence decreased when it came to Design Thinking (only 27.77% very confident) and Microlearning (25% very confident), though moderate confidence levels suggest at least partial familiarity. Despite the dip in these newer approaches, many Romanian teachers expressed readiness to engage with them.
- In Turkey, the pattern diverges slightly, with Design Thinking receiving the highest combined confidence level (54.5% confident or very confident), a contrast to other countries where this approach ranked lower. Experiential Learning followed closely (48.5%), as did Microlearning (48.5%), although the latter also had the highest proportion of low-confidence responses (18.2%), reflecting mixed experiences with implementation. Problem-Based Learning showed relatively stable application, with low levels of non-confidence (9.1%), and Inquiry-Based Learning appeared to be the



most widely accepted, with only 6.1% expressing a lack of confidence. Turkish educators thus show promise in integrating various methods, including more innovative ones, but the variation in confidence suggests uneven exposure or training.

In all four countries, **Inquiry-Based** and **Experiential Learning** are the most confidently applied teaching methods, while **Design Thinking** and **Microlearning** are less familiar and often require more support. The data highlights a general enthusiasm among VET educators for adopting active learning strategies, alongside a clear need for targeted professional development to ensure that newer or more complex methodologies are effectively integrated into teaching practice.

A cross-comparison of the average confidence levels across the five methodologies reveals that

Teachers from the four countries have identified several key teaching methods as most effective in fostering sustainability competencies, emphasising **active**, **experiential**, and **inquiry-based approaches**.

- The report highlights Project-Based Learning as the most frequently cited method in Italy, followed by Inquiry-Based Learning and Experiential Learning. Case Studies are also frequently mentioned for their ability to provide real-world context, indicating a strong preference for practical, hands-on engagement.
- In Bulgaria, Project-Based Learning stands out, with 84% of respondents favouring it, while Inquiry-Based Learning (65%) and Experimental Learning (57%) are also considered effective. Additionally, design thinking and case studies were noted by 49% of respondents, underlining the importance of methods that promote creative problem-solving and contextual understanding.
- Romania's educators primarily favour Inquiry-Based Learning, which is explicitly noted as the most popular method for teaching sustainability competencies. Project-Based Learning and Case Studies are also highlighted as valuable tools, suggesting a focus on methods that engage students in problem-solving and critical thinking.
- In Turkey, a variety of methods are preferred, with Field Trips (60.6%) being the most popular, followed closely by Inquiry-Based Learning (57.6%) and Experiential Learning (54.5%). Design Thinking (45.5%) and Case Studies (42.4%) are also prominent. This suggests that Turkish educators value inquiry and experiential learning and hands-on experiences like field trips.

The following table shows the ranking of the most effective methodologies for teaching sustainability competencies across the four countries based on the data provided:



Rank	Methodology	Italy	Bulgaria	Romania	Turkey
1	Project-Based Learning	Most frequent	84%	Frequently mentioned	Frequently mentioned
2	Inquiry-Based Learning	Prominent	65%	Most favored	57.6%
3	Experiential Learning	Prominent	57%	Frequently mentioned	54.5%
4	Case Studies	Frequently mentioned	49%	Frequently mentioned	42.4%
5	Field Trips	Not mentioned	Not mentioned	Not mentioned	60.6%
6	Design Thinking	Not mentioned	49%	Not mentioned	45.5%

Therefore, a clear trend emerges towards teaching methods that emphasise active student engagement, real-world applications, and developing critical thinking skills, with Project-Based Learning and Case Studies consistently recognised as important strategies.

Moreover, in Italy, while more than half of the respondents (44 individuals) reported lacking formal training in the methodologies discussed, the vast majority expressed a strong desire to receive such training to improve their teaching practices. In Bulgaria, nearly all respondents (96.8%) were eager to participate in training courses to enhance their pedagogical practices, particularly in applying methodologies for developing sustainability competencies, with over 95% also interested in learning how to use new technologies for creating educational resources. In Romania, despite 88.9% of respondents having no official training in the surveyed methodologies, 97.2% expressed interest in receiving training to improve their teaching, with a high demand for workshops (56.6%), blended learning (52.8%), and online courses (44.4%). In Turkey, 75.8% of respondents showed a willingness to engage in training to enhance their teaching practices, particularly in green and sustainability competencies, and 93.9% were keen on learning how to use new technologies for educational resources, with a preference for face-to-face workshops (66.7%) and blended learning (27.3%).

2.4 Digital Competencies and the Use of Technology for sustainability education

The data collected in the "Digital Competencies and Use of Technology" section of the online survey provides insights into educators' comfort levels with various digital tools and technologies, their familiarity with digital resources for sustainability education, and their overall confidence in utilising technology for teaching purposes. This analysis will highlight key findings along with prominent numbers.

 In Italy, while a plurality (38.89%) reported moderate confidence, a notable proportion expressed low confidence (20.83%), highlighting the need to address digital literacy gaps.



- In Bulgaria, nearly half (49%) of respondents feel confident or very confident using digital tools, and only 16% lack confidence, with more than 95% expressing interest in training on new technologies.
- Romania shows a generally positive outlook, with 75% of respondents using digital tools well or very well and 91.7% expressing interest in learning to use technologies for educational resources.
- In Turkey, 42.4% of respondents reported moderate confidence. In comparison, 43.4% felt confident or very confident, and only 12.1% lacked confidence, with an overwhelming 93.9% expressing interest in training on using new technologies for developing didactic resources.

Based on the survey data from the four countries, teachers have varying levels of comfort with different digital tools and technologies.

Italian teachers are comfortable with online collaboration platforms such as Google Workspace and Microsoft Teams. Many also feel comfortable with digital content creation tools and learning management systems (LMS). However, there is a notably low level of comfort with simulation software.

According to the **Bulgarian** report, the most used technologies and digital tools are those related to providing and supporting online collaborative work, such as Google Workspace, Microsoft Teams, etc. This is followed by learning management systems (LMS) such as Moodle, Canvas, etc. Some respondents also mentioned comfort with development environments and programming platforms.

The **Romanian** survey indicates that 75% of respondents use digital tools well. The report specifies that teachers are generally comfortable with commonly used technologies such as presentation software, learning management systems (LMS), and digital collaboration tools. Specific examples of digital resources mentioned as being used include Moodle, Microsoft Teams, Google Earth Engine, WWF Carbon Footprint Calculator, EcoCity, and NASA Climate Kids, as well as applications for presenting information, evaluation, and teaching. Teachers also reported comfort with online educational platforms and online collaboration platforms.

Turkish teachers show strong comfort with online collaboration platforms like Google Workspace and Microsoft Teams (66.7%). They also report being comfortable with digital content creation tools such as Canva and Adobe Creative Suite (48.5%). Like in other countries, there is a lower comfort level with simulation software.

Based on the survey data, the following table summarises the digital tools and technologies teachers in Italy, Bulgaria, Romania, and Turkey are comfortable with.



DIGITAL TOOL/TECHNOLOGY	COMFORT LEVEL
Online collaboration platforms (Google Workspace, Microsoft Teams)	High comfort level
Digital content creation tools	High comfort level
Learning management systems (LMS)	High comfort level
Simulation software	Low comfort level
Development environments and programming platforms	Moderate comfort level
Presentation software	High comfort level
Specific tools (e.g., Moodle, Microsoft Teams, Google Earth Engine, WWF Carbon Footprint Calculator, EcoCity, NASA Climate Kids)	High comfort level with various tools
Digital content creation tools (Canva, Adobe Creative Suite)	Moderate comfort level

Table 5 – The level of teachers' comfortability in the use of digital tools/technology

Based on survey data, teachers identified several key digital resources as particularly helpful for teaching sustainability and green skills.

- Italian teachers favoured online learning and collaboration platforms, along with digital content creation tools like Canva and presentation tools such as Padlet and PowerPoint. They also recognised the potential of Artificial Intelligence (AI) and Simulation Software, with some awareness of emerging technologies like virtual and augmented reality.
- Bulgarian educators highlighted interactive resources like simulations, educational games, and videos alongside tools for hands-on STEM projects, such as Micro:bit, Raspberry Pi, and Arduino. They also valued carbon footprint calculators and online collaboration platforms.
- Romanian teachers emphasised the importance of simulation software, Learning Management Systems (LMS) like Moodle, and online collaboration tools like Microsoft Teams. They also found resources like Google Earth Engine, WWF Carbon Footprint Calculator, and EcoCity helpful.
- **Turkish** teachers similarly favoured interactive multimedia resources, including simulations, educational games, videos, and presentation and activity-based materials.

Therefore, the findings suggest that teachers are looking for digital resources that are interactive, visually engaging, and practical, and that facilitate both individual and collaborative learning in the context of sustainability and green skills for engaging students, supporting collaboration, and connecting learning to sustainable practices.

In addition, concerning the level of comfort with using technology for online or blended learning from the respondents, the data show as follows:



- In **Italy**, most teachers report moderate to high comfort levels, but a minority express lower confidence, indicating a need for further training.
- In **Bulgaria**, 33% of respondents feel *very* or *extremely comfortable*, while 49% are more comfortable than uncomfortable, suggesting a generally positive outlook, though some may still benefit from additional support.
- **Romanian** teachers show a high level of comfort, with 44.5% feeling very comfortable and 55.6% comfortable using technology for online learning.
- **Turkish** educators also exhibit moderate to high comfort, with 48.5% feeling moderately comfortable and 36.4% feeling *very* or *extremely comfortable*. However, a smaller group expresses lower comfort levels, indicating room for further development and training.

Therefore, while most teachers are reasonably confident with technology, there is a consistent need for ongoing support and professional development.

Moreover, all the respondents demonstrated a strong interest in receiving training on using new technologies to develop educational resources.

- In **Italy**, 91.7% of teachers expressed a desire to improve their skills in this area, reflecting a clear commitment to enhancing their technological competencies.
- Similarly, in **Bulgaria**, more than 95% of respondents showed interest in training, highlighting the recognition of the value of technological solutions for educational materials.
- In **Romania**, 91.7% of teachers also expressed interest, signalling an increasing awareness of the potential for technology to transform teaching practices.
- Turkish educators are similarly enthusiastic, with 93.9% seeking training, underscoring their eagerness to enhance their digital skills and improve teaching and learning outcomes.



2.5 Training Needs and Preferences

Some common trends emerge regarding their preferences for training formats, with a strong inclination towards **blended learning**, **online courses**, and **face-to-face workshops**, as shown in the following figure.

- In **Italy**, blended learning is favoured by 43.1% of respondents, followed closely by online courses (41.7%) and webinars (27.8%). In-person workshops are valued by 26.4%, and mentoring/coaching is the least preferred (16.7%).
- In **Bulgaria**, blended training (52.4%) and online courses (50.8%) are the top choices, reflecting a preference for flexible, digital learning.
- In **Romania**, teachers prefer workshops (56.6%) and blended learning (52.8%), with online courses and webinars each at 44.4%. Mentoring/coaching appeals to 25% of respondents.
- In **Turkey**, face-to-face workshops dominate (66.7%), followed by mentoring/coaching and blended learning (27.3%). Online courses are less preferred (12.1%), and webinars are chosen by 18.2%.



Figure 7 – The Preferred Training Formats in the four countries.

As part of a comparative analysis of professional development needs in sustainability education, the respondents were also surveyed to identify their preferred training topics. The findings reveal shared interests and country-specific priorities, reflecting a common commitment to enhancing sustainability competencies in education while highlighting regional nuances. The table below syntheses these preferences, drawing attention to the most relevant themes and approaches valued by educators across the four countries.



ΤΟΡΙϹ	ITALY	BULGARIA	ROMANIA	TURKEY
Inquiry-Based / Experiential Learning	\checkmark	$\checkmark\checkmark$	$\sqrt{\sqrt{}}$	$\checkmark\checkmark$
Problem-Based Learning (PBL)	$\checkmark\checkmark$	$\checkmark\checkmark$	$\checkmark\checkmark$	\checkmark
Use of Digital Tools for Sustainability Education	$\sqrt{\sqrt{}}$	\checkmark	$\sqrt{}$	\checkmark
Development of Digital Resources	$\sqrt{}$	\checkmark	$\sqrt{}$	\checkmark
Understanding & Applying GreenComp	\checkmark	\checkmark	$\checkmark\checkmark$	\checkmark
Design Thinking for Sustainability	\checkmark	\checkmark	\checkmark	\checkmark
Connecting with Industry for Sustainability Projects	\checkmark	\checkmark	\checkmark	$\sqrt{\sqrt{}}$
Integrating Sustainability into the Curriculum	\checkmark	\checkmark	$\sqrt{}$	$\checkmark\checkmark$
Sustainability Management & Green Standards	\checkmark	$\sqrt{}$	\checkmark	_
Assessment Methods for Sustainability Learning	\checkmark	\checkmark	$\sqrt{}$	—

Table 6 – Preferred Professional Development Topics for Sustainability Education

2.6 Additional Comments

The survey's "Additional Comments" section allowed educators to share their thoughts on sustainability education training. Many provided no additional suggestions, implying satisfaction with current options. However, some teachers expressed a shared desire for more **practical**, **applicable**, **and integrated approaches** to sustainability education, though each country emphasised different aspects.

- Italian and Turkish teachers highlighted the importance of accessible online courses and voiced concerns about superficial approaches like greenwashing, with Italy also calling for greater student involvement.
- **Bulgarian** educators advocated for **hands-on**, **technology-driven learning** using tools like IoT devices and simulations alongside **interdisciplinary strategies** combining fields such as ecology and engineering.
- Romanian teachers proposed integrating sustainability into existing curricula, especially in biology and stressed the need for curriculum reform rather than separate sustainability subjects.



Conclusions

The GreenTeach international report presents the findings from a survey conducted to assess the training needs of technical and vocational education (TVET) teachers in Bulgaria, Italy, Romania, and Turkey regarding green and sustainability competencies. The project aims to improve the educational framework for sustainability in VET institutions while enhancing educators' competencies in alignment with European standards.

A common finding is that while some educators have a basic understanding of sustainability concepts, there are significant knowledge gaps regarding the GreenComp framework and other European and international green standards across all four countries. Many teachers report being only moderately or slightly familiar with these frameworks, highlighting a need for more structured information and training on their principles and integration into vocational education.

Educators show varying degrees of incorporating sustainability topics into their teaching, with many doing so occasionally rather than regularly. However, all countries have a strong consensus on the importance of integrating sustainability skills into vocational training curricula. Teachers recognise the growing relevance of sustainability in professional fields and express interest in developing learning pathways that enhance their students' sustainability competencies.

Regarding teaching methodologies, educators express higher confidence in more established approaches, such as project-based learning and inquiry-based learning, although confidence levels vary. Experiential learning is often viewed with high confidence. Project-based learning, inquiry-based learning, and experiential learning are considered most effective for teaching sustainability skills, along with field trips and case studies. Most teachers across the countries report not receiving formal training in many of these modern pedagogical approaches but express a strong willingness to participate in such training to improve their teaching practices. Regarding digital competencies and technology use, while many educators demonstrate moderate confidence in using digital tools and technologies, a considerable group, particularly in Italy, expresses lower confidence in developing educational resources related to sustainability. Commonly used technologies include online collaboration platforms and learning management systems. There is a strong interest in training on utilising new technologies to develop educational resources related to sustainability. Interactive and multimedia-based resources, simulations, and digital content creation tools are considered particularly useful for teaching sustainability.

Regarding the training needs and preferences, Italy and Bulgaria frequently favour blended learning (combining online and face-to-face) and online courses. Face-to-face workshops are strongly preferred in Turkey and hold significant value in Romania. The most preferred topics for professional development across the countries include applying inquiry-based and experiential learning, improving awareness of sustainability management and green standards, Problem-Based Learning (PBL) for sustainability, Design Thinking for sustainability, and using specific digital tools for sustainability education. Connecting with industry for sustainability projects and integrating sustainability into the curriculum are high-priority topics.



In conclusion, the data indicate a strong interest in and recognition of the importance of sustainability education among TVET teachers in Italy, Bulgaria, Romania, and Turkey. However, there are significant gaps in their knowledge of sustainability frameworks, confidence in using innovative pedagogical approaches, and digital competencies related to sustainability education. The teachers express a clear need and desire for practical professional development relevant to their subjects and delivered through a mix of accessible formats, including blended learning, online courses, and face-to-face workshops. Targeted training initiatives, resource allocation, and institutional support are crucial to bolster educators' ability to effectively teach sustainability and equip future generations with environmental awareness and green skills.



ANNEX - VET Teachers' Questionnaire

Understanding VET Teachers' Training Needs for Sustainability Competencies and Green Skills

Section 1: Demographic Information

- 1. What is your age group? (Multiple Choice)
 - o **18-24**
 - o **25-34**
 - o **35-44**
 - o **45-54**
 - o **55-64**
 - o **65+**

2. What is your gender? (Multiple Choice)

- o Male
- Female
- o Other
- Prefer not to say
- 3. In which country do you currently teach? (Short Answer)

4. Your Area of Expertise/Specialisation: (Multiple Choice)

- Renewable Energy
- \circ Construction
- Manufacturing
- Agriculture
- o Tourism
- Business/Administration
- Other (Please specify): (Short Answer)

5. How many years of experience do you have in teaching VET subjects? (Multiple Choice)

- o Less than 5 years
- \circ 5-10 years
- o 10-15 years
- o 15-20 years
- o 20+ years
- 6. What subject(s) do you teach? (Short Answer)

Section 2: Awareness and Understanding of Sustainability Frameworks

- 6. How familiar are you with the GreenComp framework (the European sustainability competence framework)? (*Multiple Choice*)
 - $\circ \quad \text{Not at all familiar} \\$
 - o Slightly familiar
 - Moderately familiar
 - Very familiar
 - Extremely familiar



- How confident are you in your understanding of the key sustainability competencies outlined in GreenComp? (*Linear Scale*) (Scale 1-5, 1 being "Not at all confident", 5 being "Extremely confident")
- 8. How familiar are you with European and international green standards and sustainable management standards (e.g., ISO 14001, EMAS, SDGs)? (*Multiple Choice*)
 - Not at all familiar
 - o Slightly familiar
 - Moderately familiar
 - Very familiar
 - o Extremely familiar
- 9. How familiar are you with green standards and standards for sustainable management in your specific sector? (*Multiple Choice*)
 - Not at all familiar
 - Slightly familiar
 - Moderately familiar
 - Very familiar
 - Extremely familiar
- 10. Do you incorporate sustainability-related topics into your teaching? (Multiple Choice)
 - Yes, regularly
 - Yes, occasionally
 - Not yet, but I plan to
 - Not currently

11. How important do you consider integrating sustainability competencies into your VET curriculum?

Please, express your opinion concerning the design, development and provision of learning pathways that develop the respective sustainability competencies in your VET students

Competence	l can create develop	I am interested to develop	I am not familiar with the topic	I am not interested in the topic
Valuing sustainability				
Supporting fairness				
Promoting nature				
Systems thinking				
Critical thinking				
Problem framing				
Futures literacy				
Adaptability				
Exploratory thinking				
Political agency				
Collective action				
Individual initiative				

Section 3: Teaching Methodologies and Pedagogical Approaches

9. How confident are you in applying the following teaching methodologies? (Rate from = Not confident to 5 -= Very confident) (*Linear Scale for each methodology*)

- Problem-Based Learning (PBL) (Scale 1-5)
- Inquiry-Based Learning (Scale 1-5)



- Experiential Learning (Scale 1-5)
- Design Thinking (Scale 1-5)
- Micro-Learning Approach (Scale 1-5)
- 10. Which of the following teaching methods do you find most effective for teaching sustainability competencies? (*Checkboxes*)
- Project-Based Learning
- Inquiry-based learning
- Experimental learning
- Design Thinking
- Micro-learning
- Case studies
- Guest speakers
- Field trips
- Other (Please specify): (Short Answer)
- 11. Have you received formal training in any of these methodologies? (Multiple Choice)
 - o Yes
 - o No
- 12. Would you be interested in receiving training on these methodologies to enhance your teaching practices? (*Multiple Choice*)
 - o Yes
 - **No**

Section 4: Digital Competencies and Use of Technology

- 13. How confident are you in using digital tools and technologies for developing educational resources related to sustainability? (*Rate from 1 Not proficient to 5 Highly proficient*) (*Linear Scale 1-5*)
- 14. Which of the following digital tools and technologies are you comfortable using? (Select all that apply) (*Checkboxes*)
 - Learning Management Systems (e.g., Moodle, Canvas)
 - o Online collaboration platforms (e.g., Google Workspace, Microsoft Teams)
 - Digital content creation tools (e.g., Canva, Adobe Creative Suite)
 - Simulation software
 - Other (Please specify): (Short Answer)
- 15. What type of digital resources would be most helpful for teaching sustainability and green skills? (*Paragraph Text*)
- 16. How comfortable are you with using technology to facilitate online or blended learning? (*Multiple Choice*)
 - Not at all comfortable
 - o Slightly comfortable
 - Moderately comfortable
 - Very comfortable
 - Extremely comfortable
- 17. Would you be interested in training on the use of new technologies for developing educational resources? (*Multiple Choice*)



- o Yes
- **No**

Section 5: Training Needs and Preferences

16. What type of training would you find most beneficial? (Select all that apply) (Checkboxes)

- o Online courses
- Face-to-face workshops
- Blended learning (combination of online and face-to-face)
- Webinars
- Mentoring/coaching
- Other (Please specify): (Short Answer)

17. What are your preferred topics for professional development? (Select all that apply) (*Checkboxes*)

- Understanding and applying GreenComp
- o Sustainability management and green standards
- Integrating sustainability into the curriculum
- Problem-Based Learning (PBL) for sustainability
- Inquiry-based and experiential learning for sustainability
- Design Thinking for Sustainability
- Developing digital resources for sustainability
- Using specific digital tools for sustainability education
- Assessment methods for sustainability learning
- Connecting with the industry for sustainability projects
- Other (Please specify): (Short Answer)

Section 6: Additional Comments

18. Do you have any suggestions or additional comments regarding training needs for sustainability education?

Thank you for your participation!