strengthenINg diGital pEdagogy skills aNd competencIes Of edUcatorS

GENERAL REPORT: BULGARIA

Intellectual Output No. 3:	IO TITLE: Didactic material production for Green economy pilot training
Document:	General report
Task No. 3.1:	Study of the current situation in Green Economy field
Deliverable No.:	WP3, Task 3.1.
Dissemination level:	Confidential
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Date:	(04.07.2022)
Number of pages:	22
Project No.:	2020-1-EL01-KA226-VET-094871

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Project Number: 2020-1-EL01-KA226-VET-094871

Project Duration: 01/03/2021 - 28/02/2023

Document History

Version	Date	Author	Reviewer	Description
1.0	04.07.2022	Veliana Zlateva	UoI Staff	First draft
Final	18.07.2022	Veliana Zlateva	Stiliana Todorova	Final

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Abbreviations and Acronyms:

VET	Vocational Education and Training
ICT	Information and Communications Technology
EU	European Union
AI	Artificial Intelligence
VR	Virtual Reality
TSC	Transport and Supply Chain
RD	Research and Development
SME	Small and Medium-sized Enterprises

1. ANALYSIS OF THE RESULTS FROM VET EDUCATORS' NEEDS SURVEY

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1.1 Quantitative data and analysis of the information received

Three of the partner countries – Bulgaria, Slovenia and Italy translated the survey in order to provide better understanding and quality of their answers. The rest of the partners disseminated the survey in English language. The target group among which the survey was distributed were trainers and teachers in Vocational education. And each country has the target to receive answers from 15 VET educators.

Despite the difficulties that some of the partners experienced in collecting 15 responses from VET educators, the target was reached with little delay to the deadline set.

76 VET educators in total (respondents from the 5 partner countries – Bulgaria, Greece, Italy, Latvia and Slovenia) filled in the survey.

The survey was designed with more open-ended questions for VET educators, with the expectation that based on their profile and typology they would be more willing to share information and experience. On the one hand, this helped us to gather more opinions and information. On the other hand, given the target number of responses to be collected, it was not possible to accumulate responses and derive meaningful statistical information.

In each country, VET educators who teach in different sectors were involved in the survey, but nevertheless, segmentation is clearly observed and a predominant group of one specific sector can be distinguished in most of the partner countries.

- In Bulgaria most of the participants (9 in total) teach in the Manufacturing field.
- In Italy 7 of the 15 respondents teach in the Agricultural sector, the other responses were distributed among the remaining sectors.
- Most of the answers (10 in total) in Latvia came from VET educators that teach courses in the Supply chain and transport area. The second largest teaching experience relates to the courses on Research and development (6 in total), which can be considered a general research course or the lack of specific options relevant to the respondents' teaching.
- Slovenia has distributed the answers between all preselected options and there were 6 respondents that have chosen the category "Other".
- Big diversity was also found in Greece.

Referring to question 2 "**According to your experience, what are the market needs in digital and green economy field that you identify?"** The answers could be combined in a few main areas.

- Most of the participants identified digitalization and technologies that save nature as the biggest market need. This includes the need for specific knowledge of new technologies

and applications used in the specific sectors of the partner countries. Also AI VR, data analysis etc.

- The second place could be summarized under the category "environmental-focused management". And we include all related to waste management and environmental sustainability, management of recycled materials, efficient use of resources (water, energy, soil etc.)
- The third major market challenge is to provide skilled employees trained in green competencies and possessing technical skills that match the requirements of the emerging new technologies. To meet this challenge, the need for strategies and methods to raise awareness of green technologies and the twin transition is essential.

According to the survey launched within the INGENIOUS project, these three areas could be considered as crucial for the business.

The next question provided all partners with a wide variety of answers and it was quite difficult to distinguish cumulative repeated responses. However, if we analyze the results of question 3: "**What are the emerging green skills that are vital to be acquired by the workforce?"** We can conclude that VET educators consider skills related to reuse, better use of resources (water, light, etc.) and recycling to be the most necessary for the workforce. Sustainability and circular economy are also answers given more often than others.

Question 4: "**In which area do you need to acquire additional skills in order to support the workforce in the green and digital transition?"** The most often mentioned answers in each country differ one from another. Recycle and reuse in Bulgaria; Management & entrepreneurial skills in Latvia; Sustainability, recycling and circular economy in Greece; Slovenia offered a list with answers and no one could be distinguished; Italy has identified strongly specific related to the agricultural sector needs such as Agriculture 4.0, machinery, drones, 5G.

In the question 5"**What digital skills do you need to improve in your teaching practice in order to orient the training paths towards Green Economy?"**, most answers given prove that VET educators consider that their general digital and ICT-related skills need improvement, including use of teleconferences platforms and applications related to student engagement (presentations, videos, data visualization etc.). VET educators lack software skills and work with more interactive applications and programs. There are also few participants who believe that they have the necessary digital skills and do not need additional training.

The last question 6"**What green skills do you need to improve in your teaching practice in order to orient the training paths towards Green Economy?"** is the one with the most diverse answers. And it is not possible to find any tendency or to point out any concrete need. We can

assume that since the "green" topic is just becoming established in most partner countries, there is a lack of familiarity and therefore VET educators find it difficult to identify specific needs. Here we also notice a few participants who think they do not need to improve their green skills.

1.2 Collation, comparison and systematization of the information

It is not possible to make any significant collation or comparison of the results because the number of VET educators that filled in the survey is not a significant one. The diversity of sectors and answers also complicates this task.

Questions 2 and 3 studied the market and company needs and produced the following common outcome – in order to be able to produce and implement “greener” solutions, there is a need for specific knowledge and skills related to reducing pollution and the climate change including waste management, sustainable use of resources and recycling. In relation to the management of the company – investment in human resources for acquiring green skills and competencies and overall „greening” of the organization and management of the business processes and operations. Significant needs towards the future successful implementation of the "green" EU requirements are also identified in the digital area - AI, use and knowledge of smart systems, VR, big data analysis.

Questions 4-6 addressed the issues of personal professional competences of the respondents in relevance to the courses that they are currently teaching and to their ability to create a transition to “greener” education. The summary of the results shows the following: there is a lack of knowledge regarding main concepts such as sustainability, circularity, software skills and interactive applications for better provision of the content and retaining the attention of the learners.

1.3 Summary of the results including visual examples

Most of the questions in the survey were open and there is a big diversity of opinions and needs collected. The VET respondents from the partner countries have teaching experience in different fields so we have collected a variety of points of view and needs that cannot be summarized and combined.

Summaries from the National reports:

Italy: *The main summary therefore that we can draw from this data is that there is a need in the Italian agricultural sector for highly technical skills which will allow the educator to transfer to their students the need for a more sophisticated use of resources and management. This will ensure an optimized production of crops through the use of advanced machinery, technology and AI, as well as minimizing waste and maximizing reuse of water.*

Latvia: *Most respondents teach courses in two areas: (1) transport and supply chain (TSC), and (2) research and development (RD). Their specialization has produced a visible link to their view of the market and personal professional needs. First, the respondents highlighted the need for the development of general and specific digital, programming, cloud computing and big data analysis skills, which are known to form a pillar of both TSC and RD. Second, the knowledge of the "greening" aspects of waste management and reduction of pollution, which emerged in the survey, are clearly related to TSC and secondarily to RD.*

The respondents also produced general answers that could be applicable to any sector of the economy – general "greening" processes and operations of business management and entrepreneurial activities. They acknowledged the need to enhance personal "green" competences and knowledge to enable the transition to "greener" training paths.

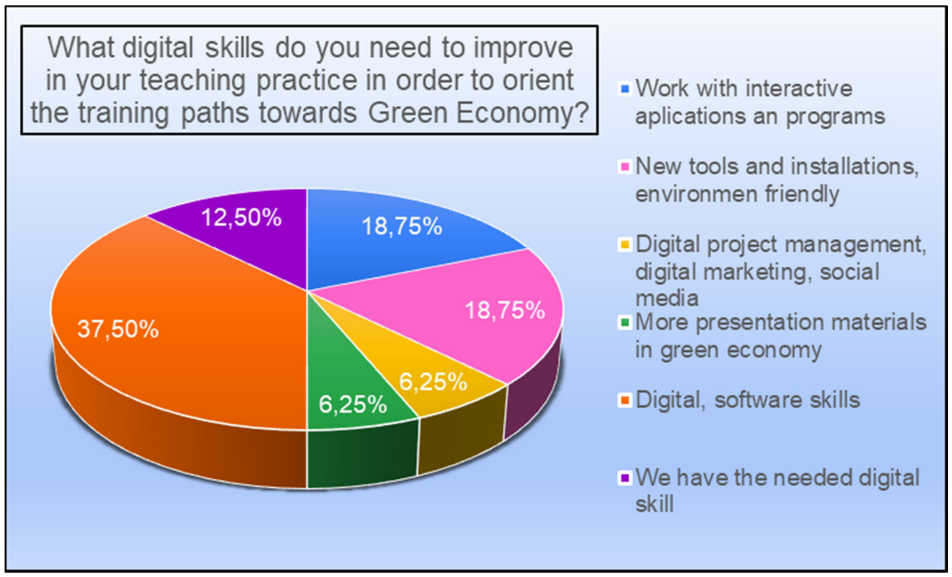
Slovenia: *The VET respondents come from different categories; therefore, their points of view are somewhat different. However, some suggestions emerged and can be summarized as follows:*

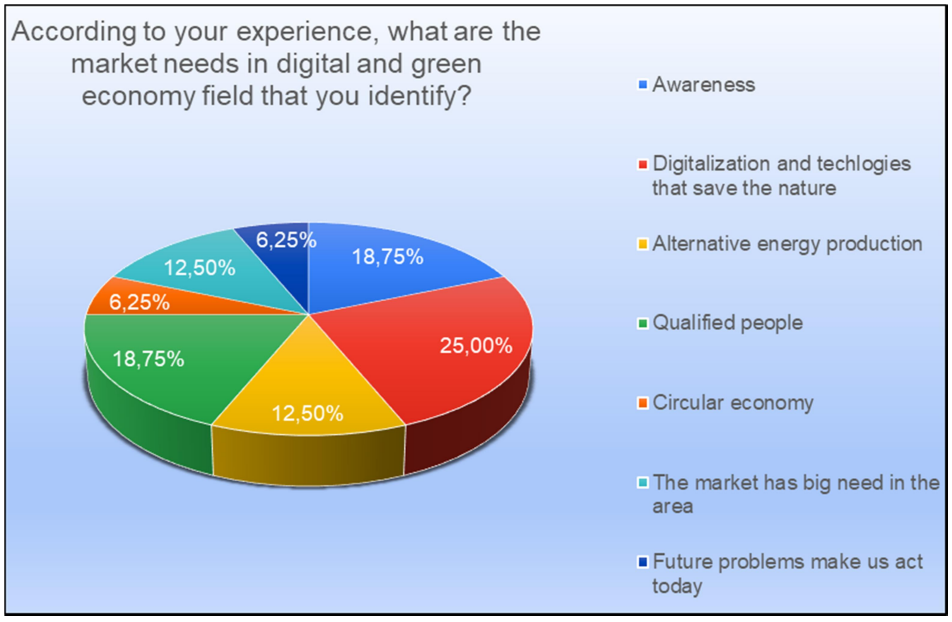
- *There is a need for changes in the educational system, which would allow for more practical presentations of how to resolve some green challenges.*
- *There is a need for awareness raising in the fields of green economy.*

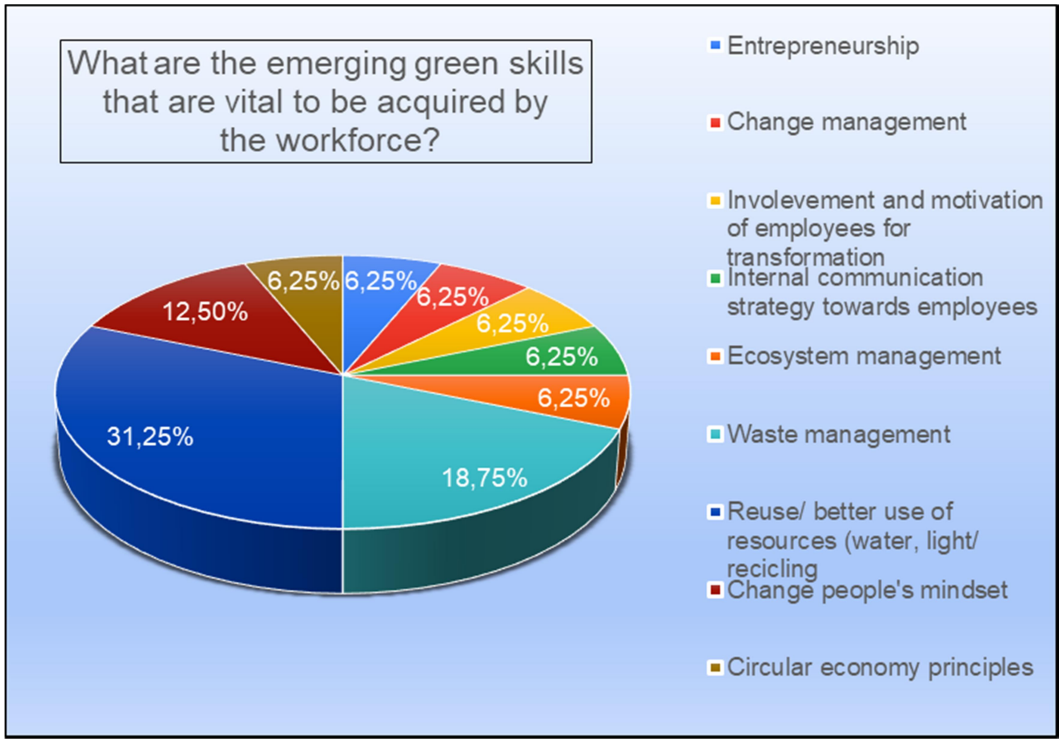
Greece: *Some conclusions that can be formed include:*

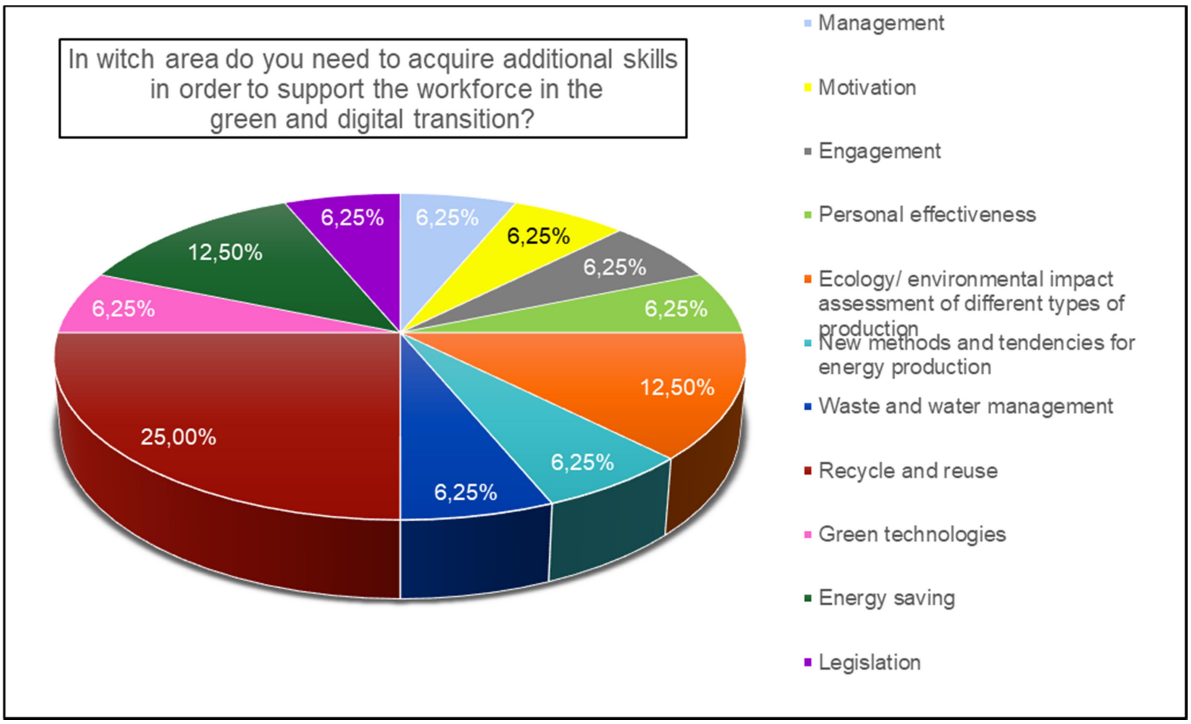
- *VET educators seem well-informed on the topic related to the green economy.*
- *The general digital skills lack that is expressed by them as a need is an obstacle towards acquiring more specific green-related skills.*
- *The results are in harmony with the industrial status of Greece and are mostly related to issues (e.g. water, waste, sustainability) that are currently very important for the green transition and Greek economy in general.*

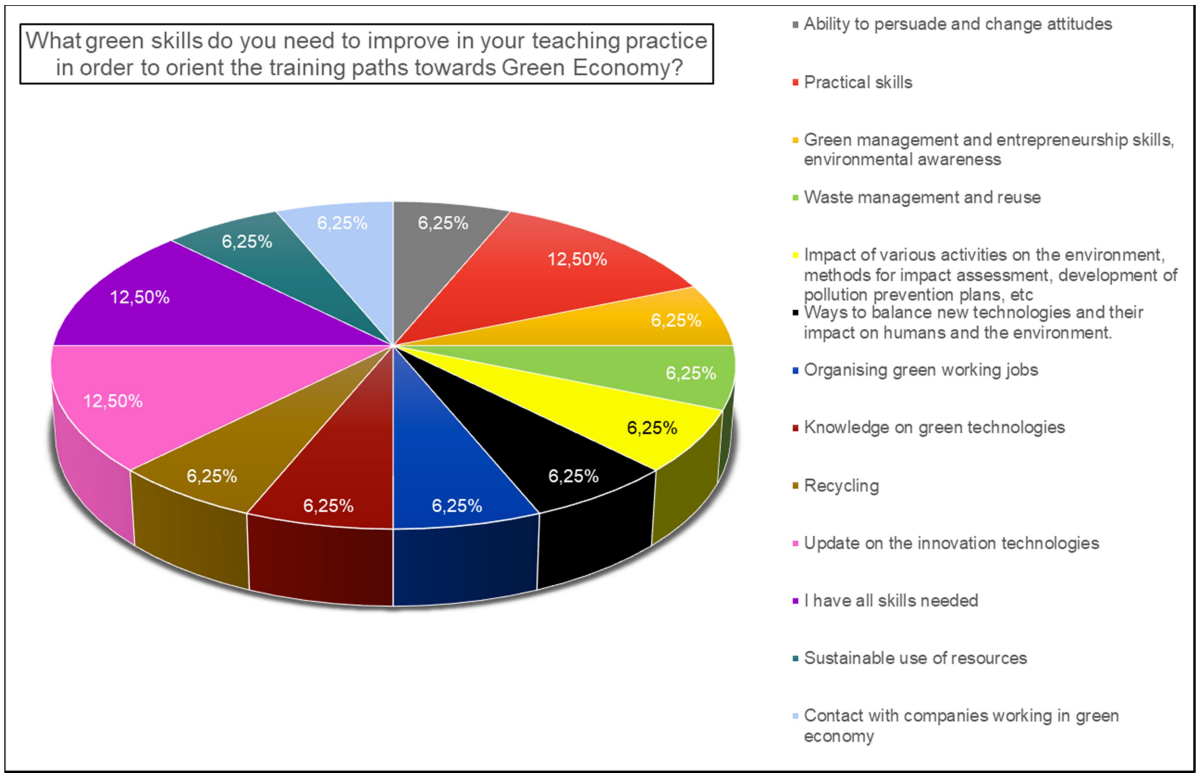
Bulgaria: *As previously mentioned the biggest number of participants in the survey are from the Manufacturing field, so we can consider that the answers received refer mostly to this sector.*


What digital skills do you need to improve in your teaching practice in order to orient the training paths towards Green Economy?
12,50%
18,75%
18,75%
37,50%
6,25%
6,25%
Work with interactive aplications an programs
New tools and installations, environmen friendly
Digital project management, digital marketing, social media
More presentation materials in green economy
Digital, software skills
We have the needed digital skill


According to your experience, what are the market needs in digital and green economy field that you identify?
6,25%
18,75%
12,50%
6,25%
25,00%
18,75%
12,50%
Awareness
Digitalization and techlogies that save the nature
Alternative energy production
Qualified people
Circular economy
The market has big need in the area
Future problems make us act today


What are the emerging green skills that are vital to be acquired by the workforce?
6,25%
6,25%
6,25%
6,25%
6,25%
6,25%
12,50%
31,25%
18,75%
Entrepreneurship
Change management
Involevement and motivation of employees for transformation
Internal communication strategy towards employees
Ecosystem management
Waste management
Reuse/ better use of resources (water, light/ recicling
Change people's mindset
Circular economy principles


In witch area do you need to acquire additional skills in order to support the workforce in the green and digital transition?
6,25%
6,25%
6,25%
6,25%
12,50%
6,25%
6,25%
12,50%
6,25%
6,25%
25,00%
Management
Motivation
Engagement
Personal effectiveness
Ecology/ environmental impact assessment of different types of production
New methods and tendencies for energy production
Waste and water management
Recycle and reuse
Green technologies
Energy saving
Legislation



2 . ANALYSIS OF THE RESULTS FROM SMES' NEEDS SURVEY

2.1 Quantitative data and analysis of the information received

Three of the partner countries – Bulgaria, Slovenia and Italy translated the survey in order to provide better understanding and quality of their answers. The rest of the partners disseminated the survey in English language. The target group among which the survey was distributed were SMEs. And each country has the target to receive answers from 15 SMEs.

Despite the difficulties that some of the partners experienced in collecting 15 responses from SMEs, the target was reached with little delay to the deadline set.

75 SME representatives in total (respondents from the 5 partner countries – Bulgaria, Greece, Italy, Latvia and Slovenia) filled in the survey.

The survey was designed with more close-ended questions taking into account the hectic working day and limited free time of the target group. This gives the possibility to systemize the answers from all partner countries.

The largest group of participants are representatives from the Transport sector (20 in total), followed by Education (19 in total), IT (10 in total) and Construction (10 in total).

Referring to question 2: "**Does your company work in Green Economy field?"** 66,8% of the respondents claim their company works in the green economy sector.

The answers of question 3: "**Do you plan to make your company „greener" in the next years?"**, show that the majority (83,6%) of the companies that participated in the survey in all 5 partner countries share their willingness to work towards „greening" their business.

Question 4: "**Do you expect an increase in the number of employees in "green professions" in the next years?"** The summarized results from all partner countries show that 70,9 % of the respondents gave positive answer, which can be interpreted that the majority of SMEs understand the line that EU is following to be climate-neutral by 2050.

The SMEs representatives from all partner countries that filled in the survey distributed their answers to question 5: "**How do you evaluate the level of difficulty in finding "green" staff for the needs of your company?"** as follows – 57,2% think that it is highly difficult, 33.4% share the opinion that the level of difficulty is medium and 9.3% consider it easy to find employees with the needed green skills.

Question 6: "**Which trainings will be necessary for your employees to support the green and digital transition of your company?"** Most of the respondents indicated that the key need for training of employees that they think is required for the support of green and digital transition in their enterprises pertains to Putting into practice green and/or circular economy model at company's employees (36 in total), followed by Introduction of "green" and "circular economy" skills and topics (34 in total), the next most frequent answers are Identification of specific internal processes with potential for ecological improvement (24 in total), Putting into practice green and/or circular economy model at company's management and administration (20 in total) and Acquaintance with the requirements of the ecological legislation (19 in total).

The question permits multiple choice so some of the participants gave more than one answer.

The conclusion: in most cases, companies do not incorporate the models of "green" or "circular economy" into their enterprises, they do not have the knowledge of that and need their workforce of all levels to receive proper training.

The answers of question 7: "**Please indicate specific area that you consider necessary to improve yours and your employees' digital green competencies."** are representing the different sectoral specifications of the partner countries and a big diversity, so it is quite difficult to extract some common results. For ex:

- In Latvia almost 80% of the responses identified the supply chain and transport as the specific area that needs improvements in the development of digital green competencies of employees.
- In Italy with 44% both Production and Energy Production and Management were the most common areas selected by respondents.
- Waste management and reduction of pollution are the most prominent choices necessary for improving digital green competencies, an estimation that refers to both SMEs representatives themselves and their staff in Greece.
- SMEs in Bulgaria need to improve their digital green competencies in the following areas: Reducing pollution and negative effects of climate change and Waste management.
- In regards to digital competences most responses of Slovenian SMEs were for "Reducing pollution and negative effects of climate change" and "Management of recycled materials", followed by (6/15) for "Land and soil management" and "Energy production and management".

The question permits multiple choice so some of the participants gave more than one answer.

The last two questions are focusing on qualitative information. Regarding question 8 "**Which specific digital green skills are most urgent to improve for you and your employees?**" there were a wide range of respondent specific answers and a long list with urgent skills to be improved. More detailed information could be found in each National report.

Question 9, "**If you have to choose the training course that you would like to attend, which one will be? What will be the name of the course?**", and the proposed courses could be used as a starting point for VET educators work and for development of courses that are strongly focused on SMEs needs.

2.2 Collation, comparison and systematization of the information

It is not possible to make any significant collation or comparison of the results because the number of SME representatives that filled in the survey is not a significant one.

However, it is obvious that all participants understand the importance of "greening" their work and are aware of the EUs priorities. All share the opinion that the need for a „green" skilled workforce is rising and a big investment should be addressed towards up-skilling and reskilling it.

There is no specific collation in the answers given that could be related to the different areas of work of the SMEs.

In Slovenia as most of the respondents (33%) come from the construction field, it is identified an interest for new materials that can be used in construction and also about the waste management, reuse and recycling of materials.

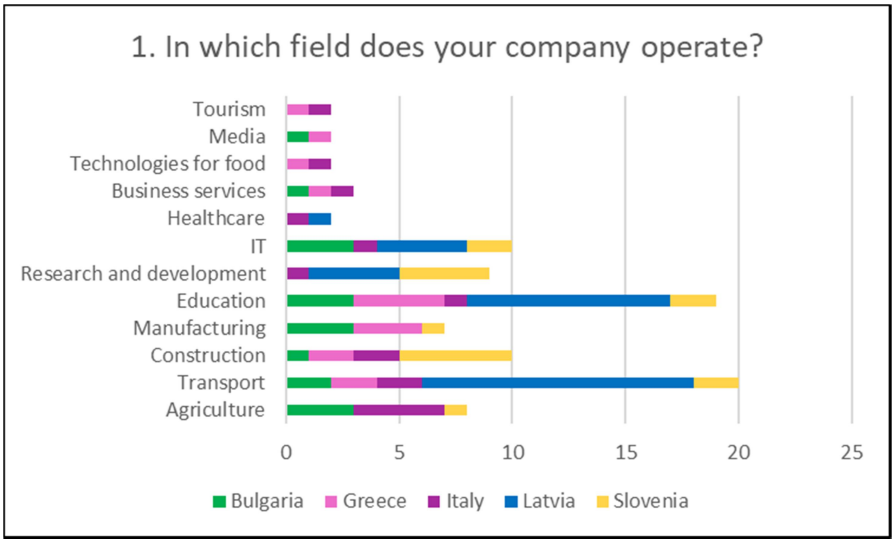
In Bulgaria the quantitative results described in the previous section drive us to the conclusion that more practical and theoretical needs regarding green knowledge and skills are arising among the companies. There are gaps that should be filled with focused training programs, developed in accordance with the business needs.

In Slovenia most respondents work in transport, education, and research organizations and the areas indicated as those in need of grener improvement were related to the specialization of these companies - supply chain and transport, pollution & climate change, and waste management, on the one hand, and research and development, on the other hand.

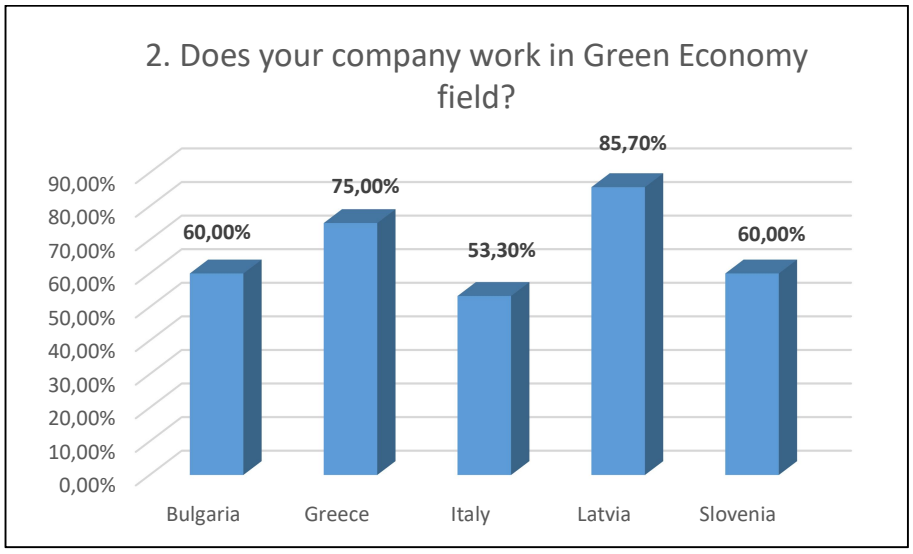
There is a need for awareness rising regarding legislation, green and circular economy, and its practical application in SMEs' management.

2.3 Summary of the results including visual examples

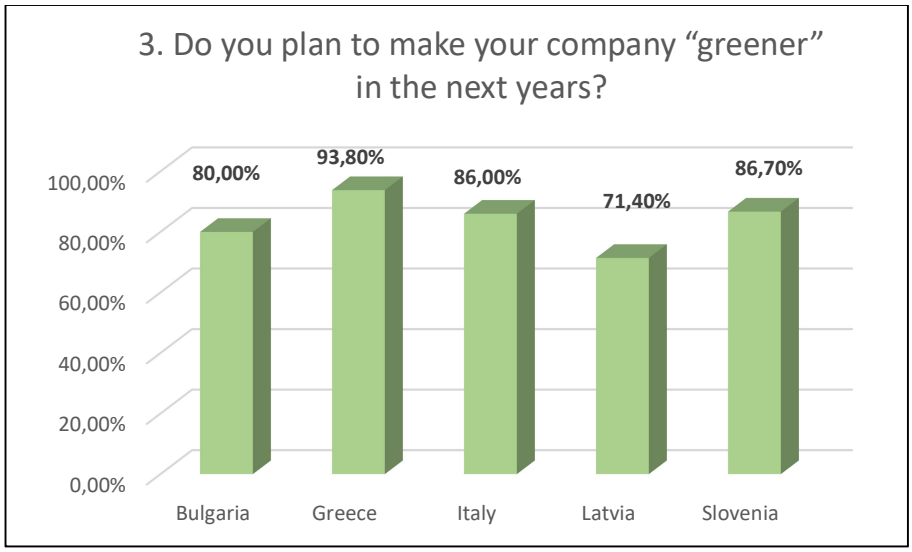
The results of the surveys of all partner countries were summarized and their visual expression is applied down.



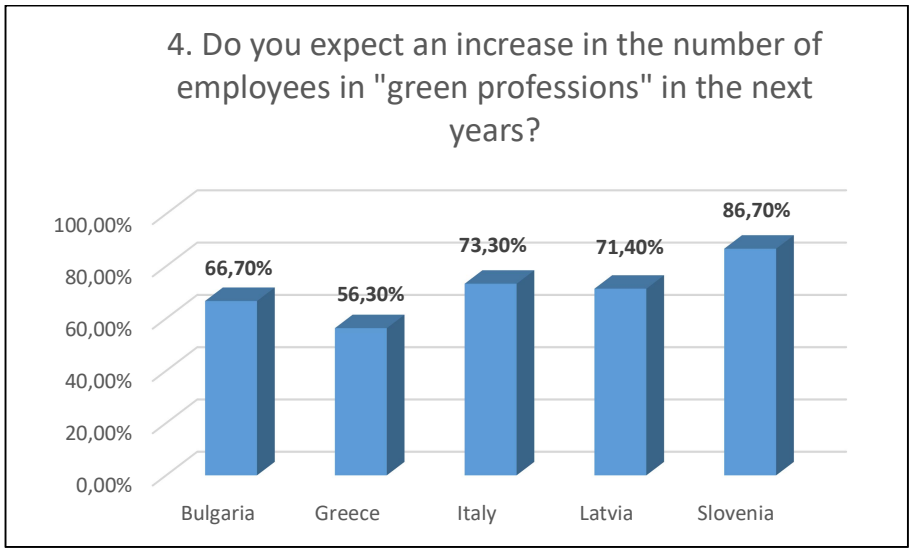
The majority of participants in the survey SMEs gave positive answers that they are working in the Green Economy field.



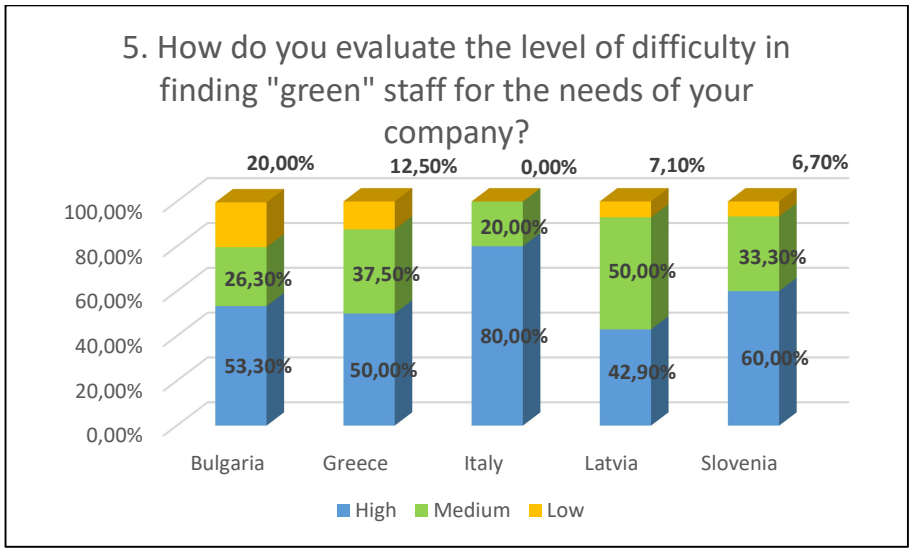
The percentage of SMEs that plan to make their company “greener” in the upcoming years is very high in all partner countries. Below you can see are summarized the YES answers.



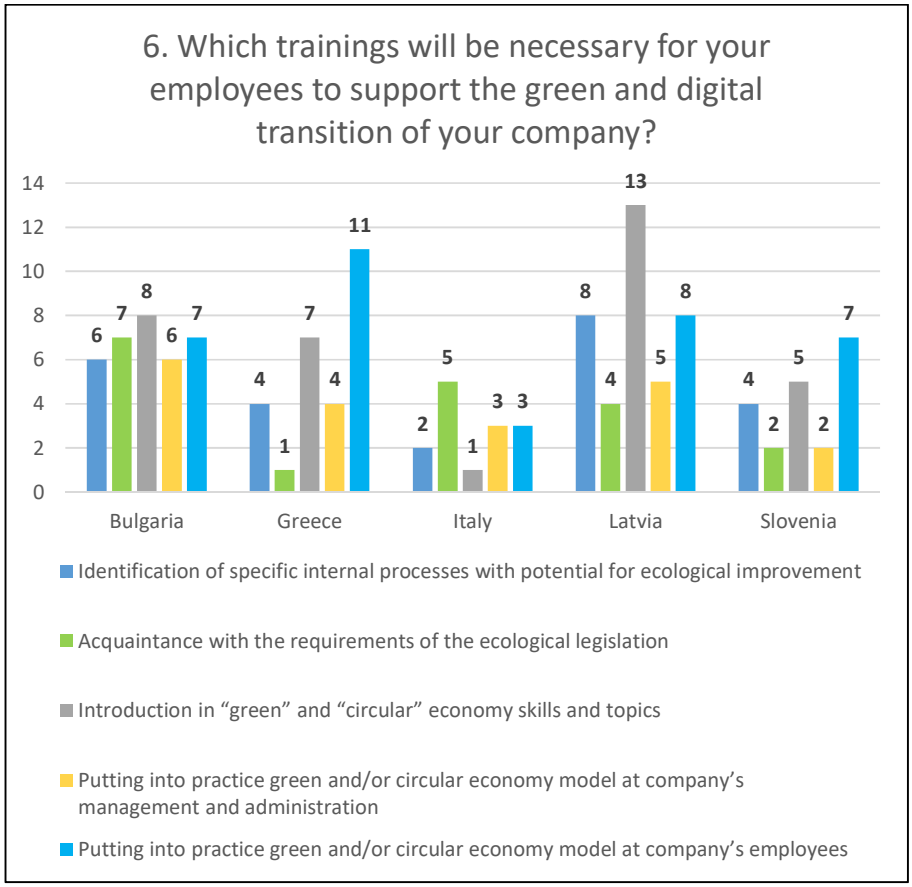
We can summarize that most SMEs that answered the questions in the survey understand the EU priorities arising from the EU Green Deal - a roadmap to sustainable economies and the higher % of positive answers (YES) of question 4 prove it.



Question 5 appears as a consequence of the previous one, and the overall result shows that more than half of the SMEs participating in the survey find it difficult to find „green“ staff for their needs.



Question 6 gives significant information regarding the training that is most needed among the SMEs respondents in the survey launched. It was described before, but here the need of practical experience is very prominent, as well as reskilling and upskilling the employees and rising awareness towards “green” topics and legislation.



The answers to question 7 are connected with the specific area that each country is focused on and are closely related with the answers of question 1.

The last two questions are open ended and permit participants to express their own ideas and needs in regards to specific digital green skills that are most urgent to improve for the company and for the employees and the name of the course the respondents would like to attend. Based on that there is a big variety of answers from each partner country that can not be combined and summarised.

3 . MAIN CONCLUSIONS

Analyzing the results from the surveys in all partner countries, we can conclude that there is a need to improve green skills of both target groups. Considering the EU aim to be „climate neutral" till 2050 this is one of the crucial topics where a lot of resources and efforts should be put. Both groups are aware of the new direction that the EU is taking but need strong support and training.

Another interesting point to note is that participants fully understand the connection between the terms "green" and "digital", considering them interlinked without having any difficulty comprehending how acquiring general and targeted technological skills will promote Green Economy. On the other hand, many suggested that technology is the answer towards a greener economy, fully embracing the concept that green digital skills can prove effective in pursuing this goal. In this relation, the general digital skills lack that is expressed by VET educators as a need is an obstacle towards acquiring more specific green-related skills.

Both VET educators and SMEs are aware of their "green" needs regarding upskilling in the near future. But another interesting fact that we found is that the companies talk more about missing theoretical and practical knowledge in the circular and green economy and acquaintance with legislation, than the VET educators. So, this should be taken into consideration in the next steps of the project implementation.

The low-to-medium level of awareness of green issues and solutions among the workforce and management teams as well as the lack of relevant training continue to sustain the high levels of demand for such professionals and the difficulty that companies experience looking for such employees.

As a general conclusion from both surveys we can highlight that the information, knowledge, skills related to „green" topics still has to be developed and improved. The important role that VET educators play in this process is undeniable and they need to be supported with the necessary tools, materials and training.