strengthenING diGital pEdagogy skills aNd competencIes Of edUcatorS

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Abbreviations and Acronyms

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1-1. IMPLEMENTATION OF ASSESSMENT PROCEDURE

1.1.1 Determining the boundaries of the test group

Within the INGENIOUS project the partnership is trying to enhance the digital skills of VET providers in the field of Green Economy, making the VET providers the main target group of the survey.

In cooperation between project partners STP and TSI 6 questionnaires were set up to cover various possible groups of VET providers, from their respective fields. This way the survey was more relevant for specific VET providers, as they are not all from the identical field (varying from agriculture to waste management). The bulk of the questions were identical, with only specific questions being included that target the specific group.

The survey was sent to various VET providers who are dealing with Green Economy and 21 complete responses from 3 different fields were collected.

That way we assure our assessment variety in answers, expertise and experience which makes the results reliable and sustainable.

1.1.2 Definition and formation of criteria and instructions for conducting a survey

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STP is the first Slovenian technology park and it has ties with both businesses and VET providers (public and private), therefore it has used its connection to present the project goals and aims. The stakeholders could contribute to the development of training materials by filling out the survey helping prepare the state of play overview of the situation about using digital competences both in the learning process and outside of it. The final outcome of the project will help the VET providers improve their capacity of using digital skills as part of the preparation and implementation of their working processes.

The survey was distributed through e-mails to the responsible people from VET providers, who then further distributed it to relevant individuals within their organisation.

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1.1.3 Collecting and storing survey data

In order to collect the survey data, Google Drive platform was used and the questions were prepared in Google Forms, from where the links were sent out to the VET providers. The survey was translated into the national (Slovene) language.

Google's analytical capability for Google Forms was used for the preliminary analysis of the feedback obtained (see Appendix II – in national language).

The surveys were organised as: A1, A2, A3, A4, A5 and A6. No replies were collected for surveys A1, A2 or A4, with only 2 replies provided for studies A3 and A6, and 13 full and 1 partial replies for study A5.

In total, 22 people responded to the survey, although with some questions allowing for multiple answers, there are questions with more than 22 responses possible. Also, 21 person did not complete the survey (after question 3 in the general part there are only 21 people still providing answers).

1-2. EVALUATION OF ASSESSMENT PROCEDURES' FEEDBACK

1-2.1 Calculation of quantitative data and analysis of the information received

Profile of respondents were collected through the general questions, however, as multiple answers were possible, the value for each is recalculated based on the number of responses given (not number of people filling out the survey).

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General questions

With General questions, the questions were the same in all three surveys.

a) Q10

The majority of respondents are teaching in VET organisations, while other respondents are in the managerial role. Additionally, one of the teachers is also at the same time in the role of a consultant.

Role in VET organisation	Number	%
Teacher	17	77
Managerial role	4	18
Teacher & Consultant	1	4,5

b) Q20

All 22 respondents have provided the level of education for which they are teaching, again, with several respondents having the possibility of teaching at various levels, therefore 31 responses were collected (with 7 people providing multiple answers), showing most people are educating in the short-cycle tertiary education. Out of the responses we can see that 1 person is teaching at 4 different levels (Technician, Lover secondary education, Upper secondary education, Short-cycle tertiary education), 1 person at 3 different levels (Lover secondary education, Upper secondary education, Short-cycle tertiary education), 5 person at two different levels, of which 3 for Lover secondary education and Short-cycle tertiary education; 1 for Upper secondary education, Short-cycle tertiary education; and 1 for Upper secondary education and Bachelor's or equivalent level.

Teaching for level of	Numbe	%

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education	r	
Technician	2	6,5
Lover secondary education	5	16
Upper secondary education	7	22,5
Short-cycle tertiary education	10	32
Bachelor's or equivalent level	2	6,5
Master's or equivalent level	5	16

c) Q30

The majority of respondents are working as fully employed staff, with only one respondent being self-employed and one respondent having VET education as a past employment. It is unclear if that person has retired, or has changed the employer and no longer works as a VET teacher.

Employment status in VET	Number	%
Self-employed	1	4,5
Technician	1	4,5
Part time temporary employment with a fixed end date	2	9
Part time temporary continuous employment	1	4,5
Full time employment	16	72,75
Past employment	1	4,5

d) Q40

As to the length of employment, no respondent has less than a year of experience, with the majority (12) having 11 or more years of working experience.

Years of employment in	Numbe	%

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VET	r	
1-3	1	4,75
4-6	6	28,5
7-10	2	9,5
11<	12	57

Teaching digital competences

With Technical digital competence questions, the questions were the same in all three surveys.

a) T10

Self-assessing their digital competences, most respondents graded themselves to be at level B2 (expert in the upper intermediate level), with no Newcomers, but with 2 people considering themselves C2 level (pioneers).

Digital competence level	Number	%
A2 Explorer	3	14,25
B1 Integrator	4	19
B2 Expert	10	47,5
C1 Leader	2	9,5
C2 Pioneer	2	9,5

b) T20

For the usage of digital tools in creating training courses, there are more people who believe they have higher competences, with 4 people at C2 level, and the slight majority is at C1 level.

Digital competence level	Number	%
A2 Explorer	3	14,2

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		5
B1 Integrator	3	14,25
B2 Expert	5	23,75
C1 Leader	6	28,5
C2 Pioneer	4	19

c) T30

In the field of inclusion of class and colleagues in the working process, the situation is even better, with a slight majority at C1 level, but at the same time 4 people at A2 level.

Digital competence level	Number	%
A2 Explorer	4	19
B1 Integrator	2	9,5
B2 Expert	6	28,5
C1 Leader	7	33,25
C2 Pioneer	2	9,5

d) T40

When it comes to using digital skills for facilitating independent learning, the situation is somewhat different. For the first time there is an answer that a person is lacking skills, while the biggest group is still C1.

Digital competence level	Number	%
A1 Lack of skills	1	4,75
A2 Explorer	4	19
B1 Integrator	2	9,5
B2 Expert	4	19
C1 Leader	7	33,25

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C2 Pioneer	3	14,25

e) T50

In the area of psychological aspects of communication, the situation is less favourable, with both groups B1 and B2 forming the bulk (47,5%) of the answers (23,75% in each group).

Digital competence level	Number	%
A1 Lack of skills	2	9,5
A2 Explorer	4	19
B1 Integrator	5	23,75
B2 Expert	5	23,75
C1 Leader	3	14,25
C2 Pioneer	1	4,75

f) T60

The situation is again somewhat more favourable when it comes to formative and summative assessments, with 38% at level B2, however, the second largest group (28.5%) is at A2 only.

Digital competence level	Number	%
A1 Lack of skills	1	4,75
A2 Explorer	6	28,5
B1 Integrator	2	9,5
B2 Expert	8	38
C1 Leader	2	9,5
C2 Pioneer	2	9,5

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g) T70

For the copyright and licensing the situation was expected to be low, mostly because the topic of intellectual right protection are sparsely covered within the educational system in Slovenia. As expected there are no C2 level responses, with the majority (33,25%) being at A2 level, and an equal distribution of A1 and C1 level.

Digital competence level	Number	%
A1 Lack of skills	4	19
A2 Explorer	7	33,25
B1 Integrator	3	14,25
B2 Expert	3	14,25
C1 Leader	4	19

General digital greening competences

With digital greening competences questions, the questions were the same in all three surveys.

a) GDGC10

When it comes to using digital tools for collecting and analysing data, the situation is not very favourable:

Self-assessment score	0	1	2	3	4	5	6
Number	2	2	2	5	4	4	2
%	9,5	9,5	9,5	23,75	19	19	9,5

b) GDGC20

In decision making, many teachers believe their skills are lacking, but the biggest two groups (47,5% both groups together) believe they have marks of 4 and 5, but nobody is confident enough to mark themselves as an advanced C2 user (mark 6):

Self-assessment score	0	1	2	3	4	5	6
Number	2	3	4	2	5	5	
%	9,5	14,25	19	9,5	23,75	23,75	

c) GDGC30

When it comes to forecasting, not too many teachers would consider themselves advanced, with only one teacher believing to be at level 6.

Self-assessment score	0	1	2	3	4	5	6
Number	2	1	3	4	6	2	1
%	9,5	4,75	14,25	19	28,5	9,5	4,75

d) GDGC40

In the case of modelling, optimization, simulation and visualisation the situation is even slightly worse, with the majority (28,5%) claiming to be at B1 level (mark 3).

Self-assessment score	0	1	2	3	4	5	6
Number	1	4	3	6	3	3	1
%	4,75	19	14,25	28,5	14,25	14,25	4,75

e) GDGC50

The use of digital tools in visual design in significantly low:

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Self-assessment score	0	1	2	3	4	5	6
Number	2	4	2	5	3	4	1
%	9,5	19	9,5	23,75	14,25	19	4,75

f) GDGC60

In case of using digital tools for data protection, there is a clear gap between those who use it (14,25% at C2 expert level) and those who don't use it (19% at A1 basic level), with no upper intermediate (C1) response.

Self-assessment score	0	1	2	3	4	5	6
Number	1	4	2	7	4		3
%	4,5	19	9,5	33,25	19		14,25

g) GDGC70

A somewhat better situation is in the field of managing processes, with most people (28,5%) claiming they are at C1 level (mark 5).

Self-assessment score	0	1	2	3	4	5	6
Number	1	2	2	5	3	6	2
%	4,75	9,5	9,5	23,75	14,25	28,5	9,5

h) GDGC80

A different situation can be seen with quality management, where the lack of skills is again more eminent, with 42,75% believe they are either B1 (mark 3) or B2 (mark 5) level of proficiency.

Self-assessment score	0	1	2	3	4	5	6

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Number	2	3	2	4	5	2	2
%	9,5	14,25	9,5	19	23,75	9,5	9,5

i) GDGC90

Risk management has proven to be one of the areas, where digital skills are undoubtable lacking, with 47,5% of people responding their level of knowledge is elementary or lower!

Self-assessment score	0	1	2	3	4	5	6
Number	3	4	3	4	3	3	1
%	14,25	19	14,25	19	14,25	14,25	4,75

j) GDGC100

Document creation seems to be a more regular task, therefore the score is significantly better, with 42,75% of respondents claiming they are at C1 or C2 level.

Self-assessment score	0	1	2	3	4	5	6
Number	1	3	3	3	2	5	4
%	4,75	14,25	14,25	14,25	9,5	23,75	19

k) GDGC110

Online communication seems to be a strong point among VET teachers' competences, with many high level users, with nobody believing they are completely lacking the skill.

Self-assessment score	0	1	2	3	4	5	6
Number		2	1	4	4	7	3
%		9,5	4,75	19	19	33,25	14,25

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l) GDGC120

Again, as online communication seems to be the strong point, the use of digital tools for communication with colleagues and partners is also at a high level.

Self-assessment score	0	1	2	3	4	5	6
Number		1	2	4	4	7	3
%		4,75	9,5	19	19	33,25	14,25

m) GDGC130

The use of digital tools in accounting, however shows a different picture, most likely linked to a fact, that most VET teachers do not have the accounting knowledge or do their own accounting.

Self-assessment score	0	1	2	3	4	5	6
Number	4	6	2	5	3	1	
%	19	28,5	9,5	23,75	14,25	4,75	

n) GDGC140

An area with a clear lack of any knowledge, with 42,75% respondents claiming they have a complete lack of knowledge is digital tools for procurement, again most likely doe to a lack of any general knowledge of procurement.

Self-assessment score	0	1	2	3	4	5	6
Number	9	4		4	2	1	1
%	42,75	19		19	9,5	4,75	4,75

o) GDGC150

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Similarly low, with 38% claiming to lack any knowledge, and additional 28,5% claiming to be at either basic or elementary level, the skills for using digital tools for legislation analysis are missing.

Self-assessment score	0	1	2	3	4	5	6
Number	8	3	3	3	3	1	
%	38	14,25	14,25	14,25	14,25	4,75	

p) GDGC160

When it comes to using digital tools for product development, maintenance, monitoring etc. the skills are still low, with the same number 28,5% of responses claiming to have not, and to have pre-intermediate skills, and with 19% claiming to have basic skills only.

Self-assessment score	0	1	2	3	4	5	6
Number	6	4	1	6	2	2	
%	28,5	19	4,75	28,5	9,5	9,5	

q) GDGC170

Similar as with product development, there is a clear lack of skills in service development.

Self-assessment score	0	1	2	3	4	5	6
Number	6	4	4	3	1	3	
%	28,5	19	19	14,25	4,75	14,25	

r) GDGC180

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In the field of problem solving, again, there is a high number (28,5%) people claiming to have no skills at all, however, unlike with many previous questions, there are now again some (9,5) respondents who feel they have advanced skills in the area.

Self-assessment score	0	1	2	3	4	5	6
Number	6	4	2	3	3	1	2
%	28,5	19	9,5	14,25	14,25	4,75	9,5

s) GDGC190

Most (23,75%) of VET teachers lack the digital skills for research and self-development.

Self-assessment score	0	1	2	3	4	5	6
Number	5	3	1	6	4	2	
%	23,75	14,25	4,75	28,5	19	9,5	

t) GDGC200

There is a very low number of respondents, who believe they have the skills to implement digital tools for lab work, with the biggest group of responses (28,5%) claiming they have no required knowledge.

Self-assessment score	0	1	2	3	4	5	6
Number	6	3	1	5	2	3	1
%	28,5	14,25	4,75	23,75	9,5	14,25	4,75

Specific digital green competences

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In the field of specific digital green competences, each of the 3 surveys had different questions. Therefore, the analysis will be divided into 3 groups (based on the questions in the survey).

As there were only 2 respondents for group 1 and group 3, it is not possible to determine a pattern, therefore only an overview is provided. However, with 17 respondents in group 2, a full analysis is provided.

Group 2 consists of 6 questions (SDGC250 – 300), connected to waste management.

SDGC250 Most respondents (35,3%) have 0 knowledge in use of digital tools for reducing emissions from waste.

Self-assessment score	0	1	2	3	4	5	6
Number	6	3	2	2	2	2	0
%	35,3	17,6	11,8	11,8	11,8	11,8	0

SDGC260 Most respondents (41,7%) have 0 knowledge in use of digital tools for reducing environmental pollution produced by farming.

Self-assessment score	0	1	2	3	4	5	6
Number	7	4	2	1	0	3	0
%	41,2	23,5	11,8	5,9	0	17,6	0

SDGC270 Most respondents (47,1%) have 0 knowledge in use of digital tools for water cleaning.

Self-assessment score	0	1	2	3	4	5	6
Number	8	2	3	3	0	1	0
%	47,	11,	17,	17,	0	5,	0

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	1	8	6	6		9	

SDGC280 Most respondents (53,9%) have 0 knowledge in use of digital tools for air cleaning.

Self-assessment score	0	1	2	3	4	5	6
Number	9	2	2	3	0	1	0
%	53,9	11,8	11,8	17,6	0	5,9	0

SDGC290 Most respondents (53,9%) have 0 knowledge in use of digital tools for reduction of negative effects of climate change.

Self-assessment score	0	1	2	3	4	5	6
Number	9	1	2	1	2	2	0
%	53,9	5,9	11,8	5,9	11,8	11,8	0

SDGC300 Most respondents (53,9%) have 0 knowledge in use of digital tools for forecasting climate and weather change.

Self-assessment score	0	1	2	3	4	5	6
Number	9	1	3	2	1	1	0
%	53,9	5,9	17,6	11,8	5,9	5,9	0

GROUP 1: In group 2 only 2 people provided answers.
SDGC 130: *Optimisation of production 1 0 and 1 B2 digital technology user.*
SDGC 140: *Transition to green ecosystems 1 0 and 1 B2 digital technology user.*
SDGC 150: *Green optimisation of work process 1 0 and 1 C1 digital technology user.*

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SDGC 160: *Technical support for green areas 1 0 and 1 B2 digital technology user.*
SDGC 170: *Changes in green demand 1 0 and 1 B2 digital technology user.*

GROUP 3: In group 3 only 2 people provided answers.
As seen from answers below, the possible lack is in the areas SDGC 310, 320, 330, 340, 350, 360, and 450.
SDGC310: Green water management in farming 1 A2 and 1 B2 digital technology user.
SDGC320: Purification of waste water 2 A2 digital technology users.
SDGC330: Classification of waste 2 B1 digital technology users.
SDGC340: Sorting waste 1 B1 and 1 B2 digital technology user.
SDGC350: Special treatment of waste 2 A2 digital technology users.
SDGC360: Integration of renewable sources 1 A2 and 1 B2 digital technology user.
SDGC370: Green materials in construction 2 C1 digital technology users.
SDGC380: Green processes in construction 1 B2 and 1 C1 digital technology user.
SDGC390: Integration of non-renewable sources 2 B2 digital technology users.
SDGC400: Chain of reuse of resources 2 C1 digital technology users.
SDGC410: Material recycling 2 C1 digital technology users.
SDGC420: Managing recycling process 1 B2 and 1 C1 digital technology user.
SDGC430: Cultivating turf 2 B1 digital technology users.
SDGC440: Sustainable management of soil 1 B1 and 1 B2 digital technology user.
SDGC450: Green farming 1 A2 and 1 B1 digital technology user.
SDGC460: Recognition of nutrient value of eco product 1 B2 and 1 C1 digital technology user.
SDGC470: Managing nutrient value 1 B2 and 1 C1 digital technology user.
SDGC480: Preservation of farming land 1 B1 and 1 B2 digital technology user.
SDGC490: Managing invasive species 2 B2 digital technology users.

1-2.2 Collation, comparison and systematization of information

Overall, there is a belief that VET providers posses the specific knowledge to use digital technologies, or to be able to learn how to apply them. They feel comfortable enough using them, however, if it is not required, they do not develop it as a skill.

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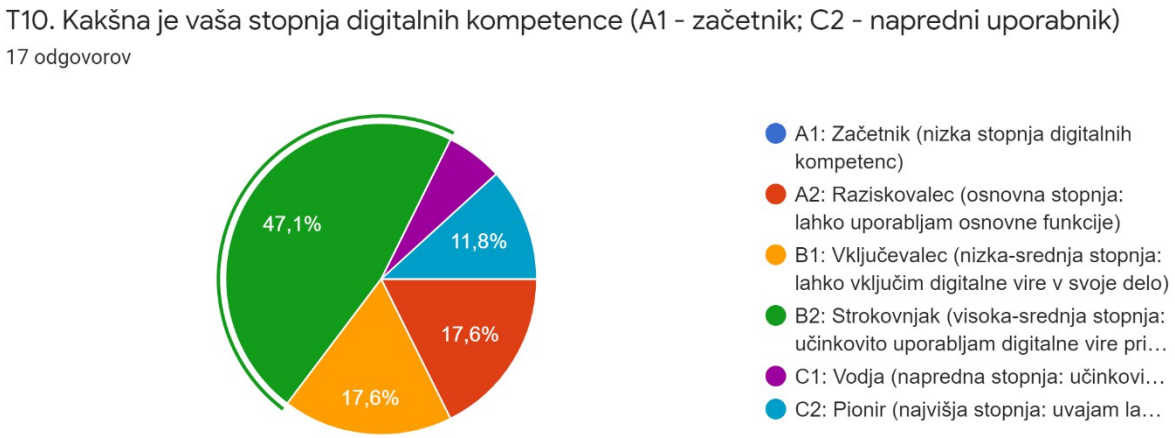
According to their own assessment, they are relatively well prepared for using digital skills, however, when it comes to application, they are not applying it, or the areas of their work do not include the fields covered in questions (such as procurement, reduction of air pollution, and similar).

1-2.3 Generating a report with visual diagrams

The situation shows, that VET providers most likely do not use digital technologies in situations not related to their work.
This is further supported by the overall sentiment among the pedagogical staff in Slovenia, that often it's the students themselves, who are teaching teachers how to use digital technologies.
Nevertheless, in the fields where they are applying digital technologies more often, the teachers are more confident in their level of digital competence.

Example: What is your level of digital teaching competence?
2 C2 level users – 0 A1 level users



At the same time, there are areas where teachers have no competence at all, therefore they also lack digital competence – not because they are lacking digital competences in the area, but

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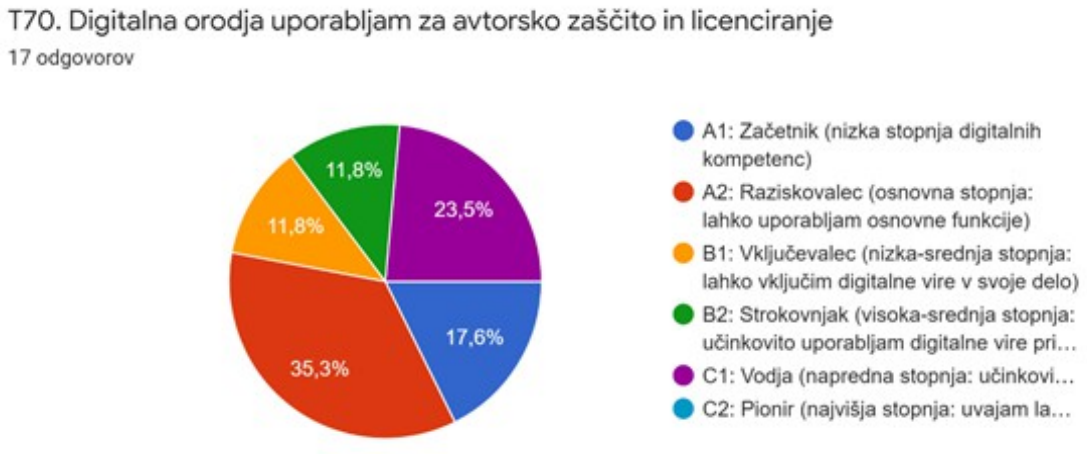
because that area is outside of their pedagogical work and they lack any competence in that area.

Example: I use digital tools for copyright and licensing

0 C2 level users – 3 A1 level users



Also, and this is more important, we can observe that except for communication, there are always respondents claiming to have no digital skills in the area, therefore a general lack of skills is evident.

Additionally, communication is the only area, where there were more than 50% of responses that claim they have C1 or C2 level of digital knowledge.

This clearly indicated the need for improvement of digital competences in the target group that provided survey feedback. However, as that is a group of only 21 people, it is far from being representative on the national level, although based on experience, it seems possible that competences that are not directly required in the field of work are lacking, unless there is a strong personal drive to increase the personal level of knowledge.

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APPENDICES

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APPENDIX I. General information on national reports

1. Survey aim and justification

The aim of the survey was to assess greening and green digital skills of VET instructors. The following reasons justified the aim: to determine the readiness of VET staff for teaching online, to identify gaps in VET skills for further professional development, to recruit properly qualified VET staff, to assess VET instructors' professional and teaching competences, to design new courses on circular economy and specific green courses developing general greening competences and specific green competences of students through the spreading activation processes from teaching-to-student, etc.

2. Survey design

The survey was designed on a set of courses administered by VET instructors in Greece, Italy, Bulgaria and Slovenia (table 1).

Table 1. Countries and course descriptions

Country	Institution	Courses
Italy	Higher Technical Institute "Territory Energy Building Foundation"	Energy Supply
	Higher Technical Institute "Territory Energy Building Foundation"	Waste Management
	High Technician Institute "Ignazio Calvi"	Agri Food Systems
Slovenia	University of Maribor	Ecology Problems of Vehicle and Internal Combustion Engines
		Sensible Use of Energy
		Technological and Waste Waters
	University of Nova Gorica	Environment and Agriculture
		Environmental Impact Assessment
		Land Ecosystems
		Environmentally Friendly Technologies
	Environment Protection College	Waste Management
		Rational Energy Use
		Development of Sustainable Products, Services and Processes
		Waste Water Treatment
	School Centre Ptuj	School for economy, tourism and agriculture
		School of Electrical and Computer Engineering

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Bulgaria	Cleantech Bulgaria	Waste Management in the Construction Industry
	Cleantech Bulgaria	Transition towards Circular Economy as a New Business Opportunity

Almost all course descriptions contained skills, knowledge and competences that could be applied to any course and any profession, on the one hand, and on the other hand, courses that were specific to the given course and profession. The former courses laid the foundation for competences labelled as *general greening digital competences*, whereas the latter courses provided the information on *specific green digital competences*. These different types of competences were introduced into two separate sections of the survey – Sections 4 and 5, respectively, bearing identical labels. Section 4 "General Greening Digital Competences" was partly consistent with the European framework "Digital Competences" (DigComp), which was designed for commercial applications.

The survey contained also other sections. Section 1 provided general information on the survey, such as the survey goal and data processing information. Section 2 collected general information on participants, such as their work experience and country of teaching. Section 3 focused on obtaining general information on teaching competences. This section was designed by integrating general provisions of the European framework "Digital Competences for Educators" (DigCompEdu) and the obtained course descriptions.

The summary of the survey blocks is provided in table 2.

Table 2. Survey blocks

Block #	Block title	Block areas	Number of questions
Section 1	General information about the survey	• Survey goal • Data privacy statement	0
Section 2	General questions about you	• Work experience	4
Section 3	Teaching digital competences	• Designing the teaching content • Creating engagement with students and colleagues • Facilitating students' independent learning • Communication • Assessment	7

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		• Copyright and licensing	
Section 4	General digital greening competences for sustainability	• Data collection and use • Work flow management for efficiency and transparency • Communication • Financial and legal aspects • Research and development	20
Section 5	Specific digital green competences	• Overall agriculture management • Supply chain and transport, including drones • Manufacturing • Energy production and management • Reducing pollution and negative effects of climate change • Use of resources (water management, waste management, management of integrated resources, management of recycled materials, land and soil management)	49

The answers were collected via the multiple choice or Linkert scale questions. The Linkert scale questions ranged from 1 to 5 and 0 to 6 and were aligned with the level of competences (table 3).

Range of competence levels	
1 - 5	**0 - 6**
1 - lack of knowledge 2 - basic (A1-A2) 3 - pre-intermediate (B1) 4 - intermediate (B2) 5 - upper intermediate (C1) 6 - advanced (proficient) (C2)	0 – lack of knowledge 1 – basic (A1) 2 - elementary (A2) 3 - pre-intermediate (B1) 4 - intermediate (B2) 5 - upper intermediate (C1) 6 - advanced (proficient) (C2)

3. Design of country-specific questionnaires

Since some questions of the survey were irrelevant to the needs of some countries, institutions and courses, each participant selected a set of questions for their unique course requirements. This resulted in shorter questionnaires. Each questionnaire contained all information and questions from Sections 1-3. These were Sections 4 and 5 that were not used in full. The resulted

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questionnaires were translated into local languages., whereas the master copy was translated into Latvian. More information on country-specific questionnaires and their results is available in country-specific appendices.

4. Roles of participating institutions in the survey

To represent the European scale of responses, a set of countries, represented by specific institutions, created and administered the survey (table 1).

Country	Institution	Responsibilities
Latvia	Transport and Telecommunication Institute	Creation of the surveys, translation of the surveys into Latvian
Greece	University of Ioannina	Reviewer of the surveys, translation of the surveys into Greek, administration of the selected surveys to VET instructors
Italy	Sistemi Formativi Confindustria	Reviewer of the surveys, translation of the surveys into Italian, administration of the selected surveys to VET instructors
Bulgaria	Cleantech Bulgaria	Reviewer of the surveys, translation of the surveys into Bulgarian, administration of the selected surveys to VET instructors
Slovenia	Styrian Technology Park	Reviewer of the surveys, translation of the surveys into Slovenian, administration of the selected surveys to VET instructors

APPENDIX II. Result data of surveys

- Excel files of surveys
- Tables and charts from Google.Drive surveys
- Charts, diagrams, etc., displaying the analysis of results from section 1.2.

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APPENDIX III. Requirements for the VOOC platform

- Requirements for the implementation of the surveys by the digital platform

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