Summary of research conducted within the project

Basic analyses

Within the project we planned two types of research:

— Primary quantitative research planned within the project as questionnaire surveys on a sample of students of selected fields of study. The research was conducted in the period of March – June 2022.

— Qualitative primary research carried out in the form of individual in-depth interviews with experts who specialise in the fields of study indicated in the project. The research was conducted in the period of May – July 2022.

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1 Background information

Quantitative research

There are two goals of the quantitative research carried out in the project. The first is to measure the knowledge among students of the competences desired by employers and the self-assessment of the level of these competences, as well as the assessment of various aspects related to entering on to the labor market, including taking up additional educational activities by students. The second is to find out about the distance learning experience. The research results will contribute to the development of solutions designed to improve the quality of education. The study was addressed to students of three fields of study: construction technician, logistics technician and renewable energy devices and systems technician. Students of technical schools from Poland, Spain, Bulgaria and Greece participated in the study.

Preliminary assumptions: N=400 respondents

The survey was carried out using the CAWI method, with specially prepared questionnaire forms and interviews (10 minutes each). The questionnaire form was prepared in English and then translated into the national languages of the project partners.

Qualitative research

The main objective of the qualitative research was to obtain information on the demand for competences necessary to perform the professions which the fields of study selected in the project potentially prepare candidates for. The collected data will be used to develop a tool for remote competence assessment of students of the selected fields of study.

The research was addressed to 2 target groups:

1. Employees of vocational education sector – people responsible for a given field of study, cooperating with the economic environment or working in companies from selected fields of study.
2. Practitioners - people in managerial positions, responsible for hiring employees, assessing the level of employees' competences and planning employee development.

Preliminary assumptions: N=40 people

The research was conducted with the use of a specially prepared interview scenario in English and translated into the national languages of the project partners.

2 Quantitative research

A total of 428 people took part in the survey. The results by country and field of study are presented in Table 1 and in Table 2.

Table 1 The number of respondents participating in the survey in the area of selected fields of study

Field of study/ country	Poland	Greece	Bulgaria	Spain	Erasmus+ mobility*	Total
Logistics technician	105	41	0	24	24	**194**
Renewable energy technician	19	39	0	6	5	**69**
Construction technician	47	29	67	3	19	**165**
Total	**171**	**109**	**67**	**33**	**48**	**428**

* The Erasmus + mobility category included students who participated in the study during vocational internships in Spain as part of the Erasmus + mobility project. The students came from Poland (22 people) and Croatia (26 people) and completed the questionnaire in English.

Table 2 The number of respondents participating in the survey – based on the country where the survey was carreied out.

Field of study/ country	Poland	Greece	Bulgaria	Spain	Croatia	Total
Poland	171	0	0	0	0	**171**
Greece	0	109	0	0	0	**109**
Bulgaria	0	0	67	0	0	**67**
Spain	22	0	0	33	26	**81**
Total	**193**	**109**	**67**	**33**	**26**	**428**

Participation in the study of students according to the project Partner who obtained the survey is shown in Figure 1, due to the respondent's country of origin or the country of study in Figure 2 and the direction of education in Figure 3.
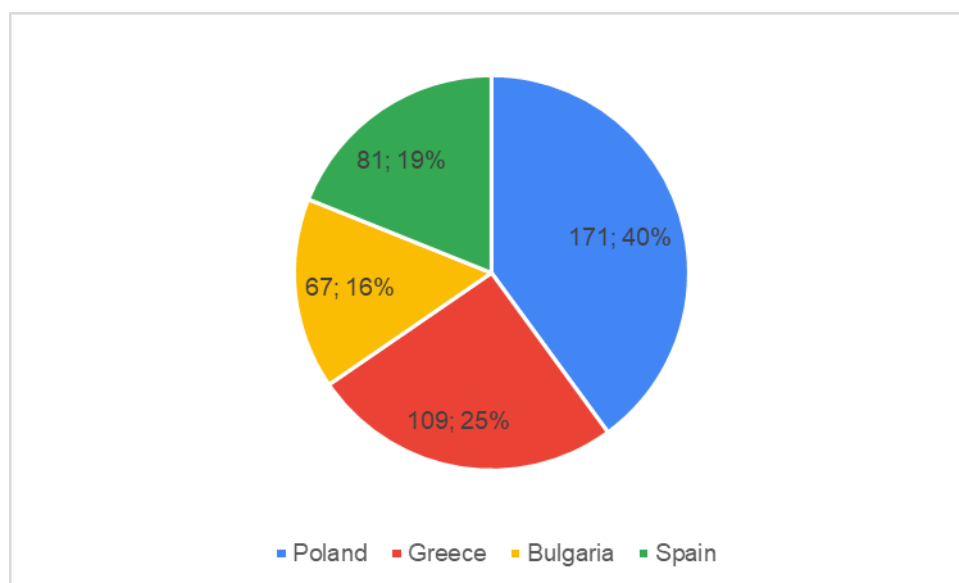

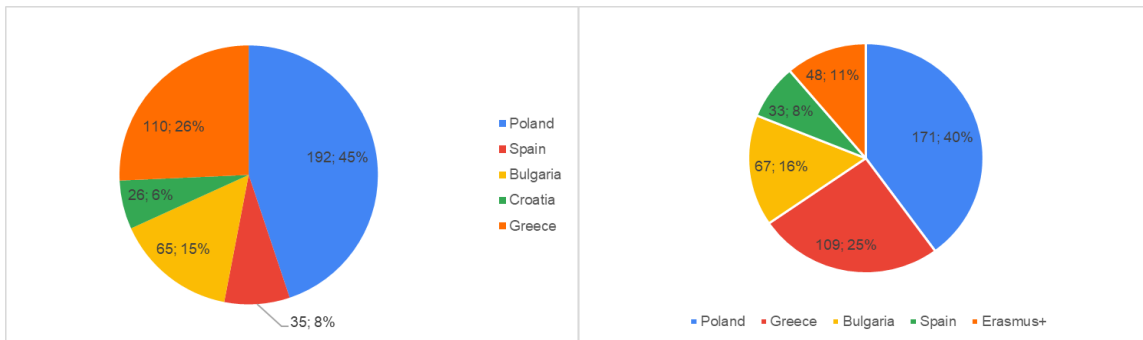*Figure 1 Respondents participating in the survey by country of project`s Partners*

Figure 2 Respondents participating in the survey by country

The structure of the sample, depending on the respondent's country of origin or his / her education, was highly diversified. The respondents from Poland constituted 40% of the surveyed sample. It is worth pointing out that Polish students appeared in the research carried out both in Poland and in Spain (a group participating in the Erasmus + mobility project). Respondents from Greece constituted 25% and respondents from Bulgaria respectively 16% of the sample. Unfortunately, Spanish students account for only 8% of the sample, and in addition, students from Croatia, a country outside the project partnership, took part in the study. Strongly differentiated groups representing individual countries constitute a certain difficulty in the case of using statistical comparative methods, in which samples of a similar size are recommended. On the other hand, the appearance of a representation of students participating in the mobility project in the study may bring additional effects in the form of comparing their responses with the responses of the rest of the surveyed population.
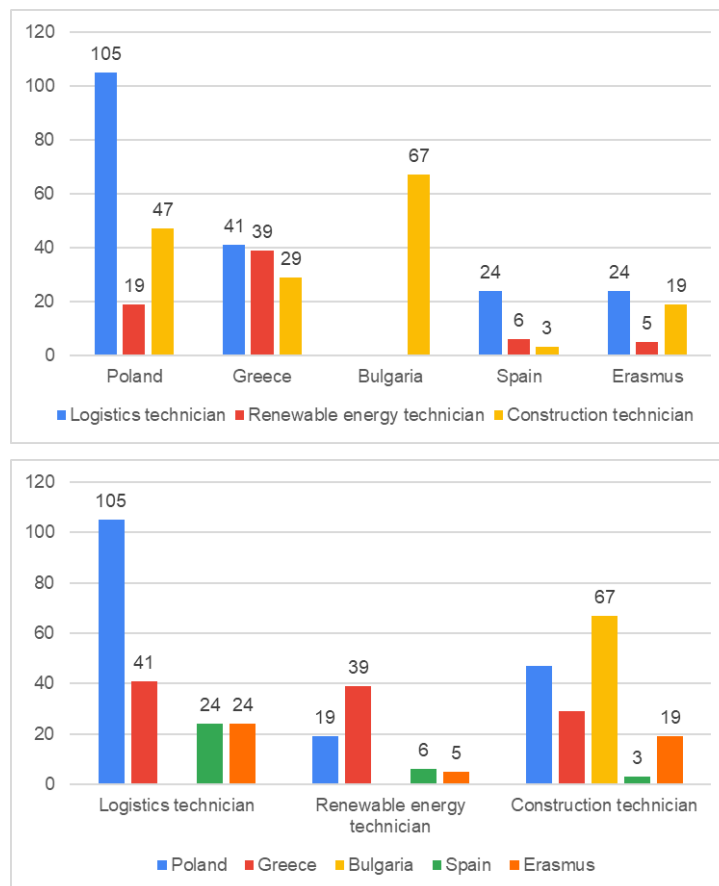

Figure 3 Respondents participating in the survey and their fields of study

Most of the respondents were students of the field of study - Logistics technician (45,3%) and Construction technician (38,6%). Renewable energy devices and systems technician accounted for 16,1% of the total surveyed population.

Figures 4 and 5 present the remaining metric characteristics of the respondents participating in the quantitative research.
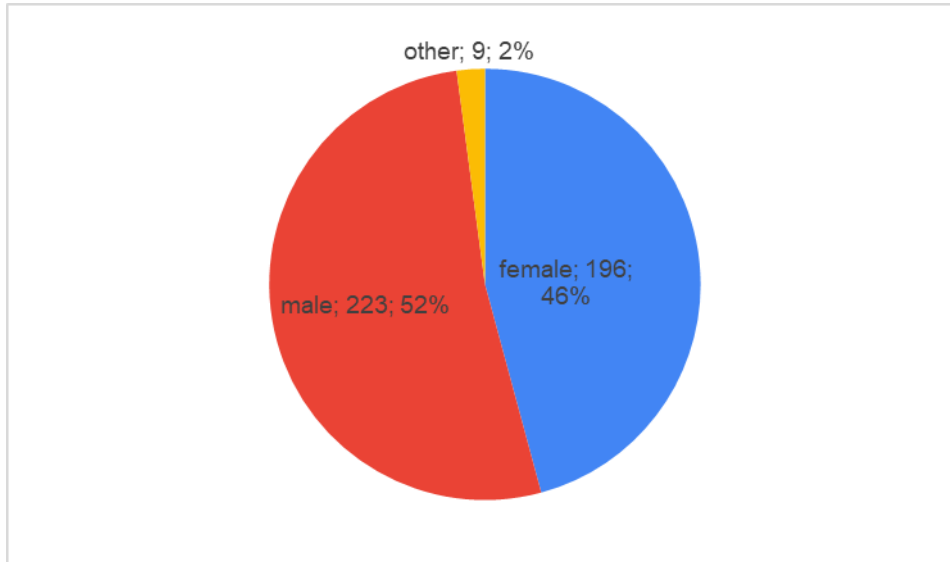

Figure 4 Respondents participating in the research by gender

The male respondents constituted 52% of research participants, whereas the female ones - 46%. Nine people (2% of respondents) ticked the "Other" option.

Figure 5 presents information on the respondent's status in the field of education. Three categories have been identifies: student of penultimate class of technical secondary school, student of the last class of technical secondary school and technical school graduate. In the study, the most numerous group were students of the last class of technical secondary school (56%). For the purposes of data analysis, the group of students from the last and penultimate grade will be merged, and the analyzes will be conducted for two subgroups: student - graduate.
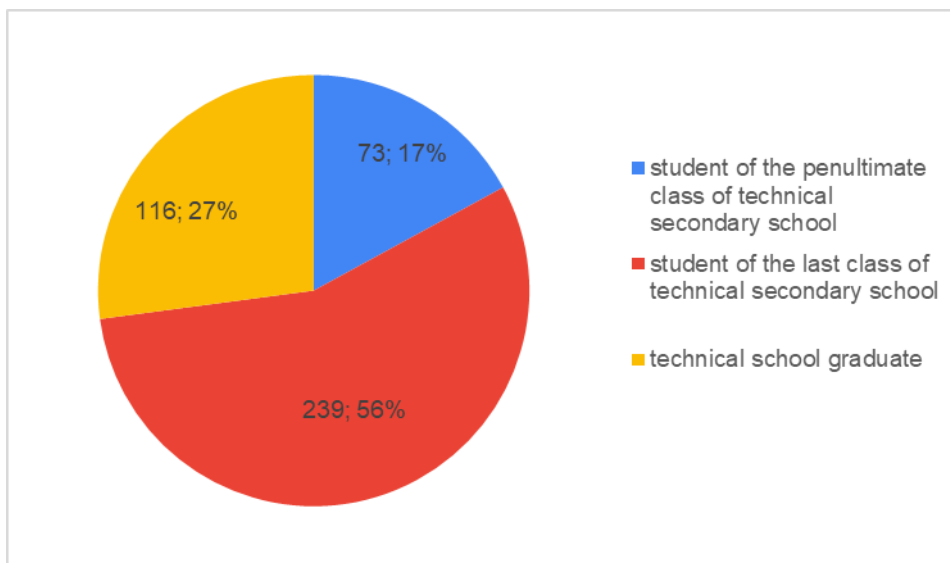

Figure 5 Students participating in the research - by the status of education

In the content-related part, the questionnaire covered several areas - the importance of different types of competences and self-assessment when preparing for entering the labour market, as well as the evaluation of the period of distance learning forced by the Covid-19 pandemic. Later in the report, synthetic results are presented.

2.1 Competences

First, the respondents were asked to assess the importance of the 11 types of competences for the employment of graduates of a given field of study, and next - to assess the level of these competences in themselves.

Question 1. 1. In your opinion, how important are the following competences for the employment in your field of study? Grade on a scale from „1" (Not important at all) to „5" (Very important)
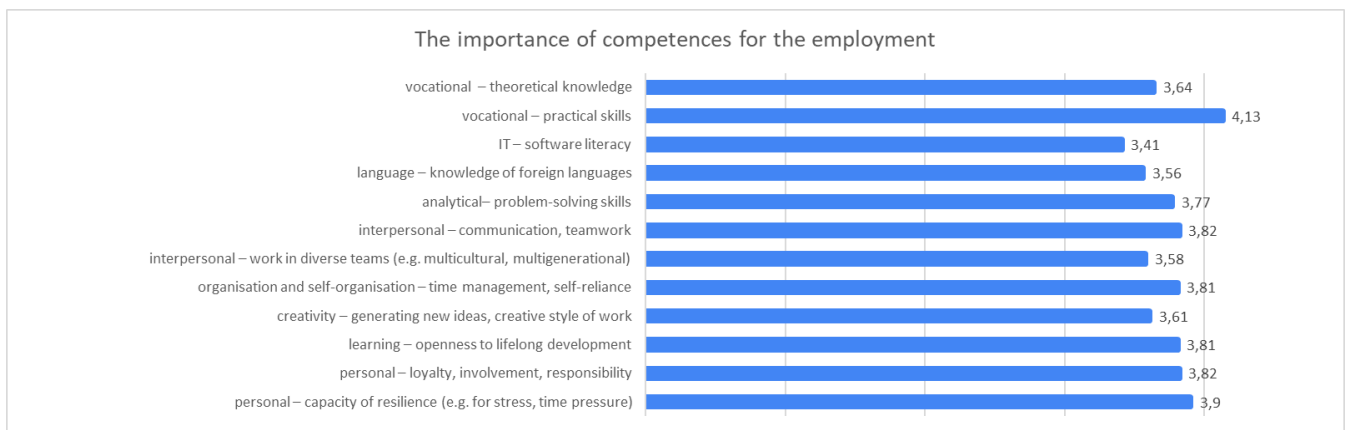

Figure 6 Importance of competences when employing graduates – average values

The respondents assessed all the listed competences as important, with the average evaluation ranging from 3,41 for IT software literacy to 4,13 for professional practical skills. It is also worth noting that high evaluations were also assigned to soft skills such as personal – capacity of resilience, e.g. for stress, time pressure (3,9) and loyalty, communication and teamwork (both for 3,82).

When answering the second question, the respondents were asked to assess their own level of these competences.

Question 2. How do you assess your level of the following competences? Grade on a scale from „1" (Insufficient) to „5" (Fully sufficient)
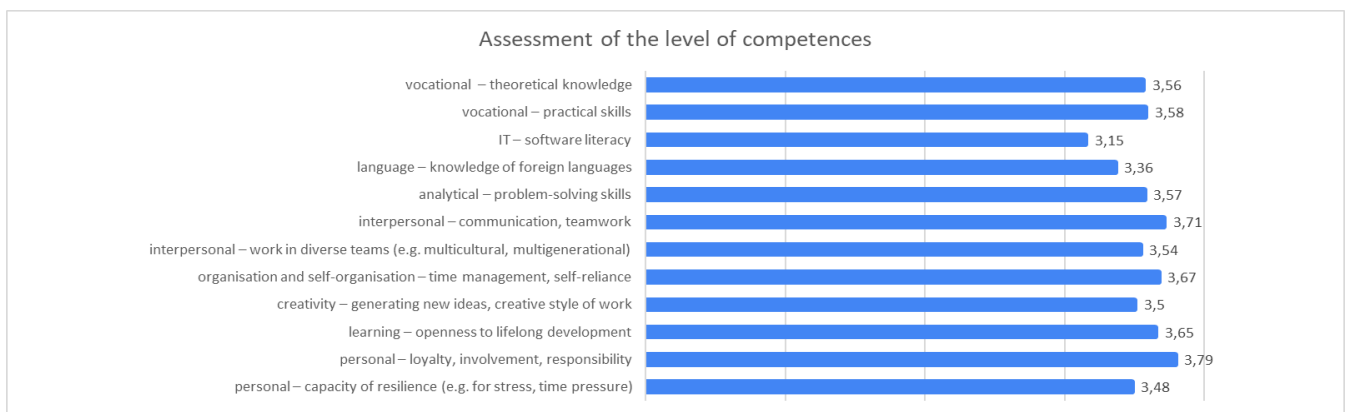

Figure 7 Self-assessment of the level of competences performed by the respondents

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The mean evaluations of the self-assessed level of competences are usually lower than those of their importance. This applies mainly to practical vocational skills (3,58 with an importance level of 4,13), whereas selected soft skills appeared to be exceptions because their self-assessment is similar to the level of their importance obtained in Question 1. For example, "communication and teamwork" – importance 3,82 and self-assessment 3,71, whereas "personal competence" – importance 3,82 and self-assessment 3,79. However, it is worth pointing out that these aggregate results are at odds with the employers' perceptions of generation "Z" graduates, especially when it comes to their loyalty, commitment and responsibility towards employers.

A detailed comparison of the different types of competences and the self-assessment of their level among the respondents is as follows:
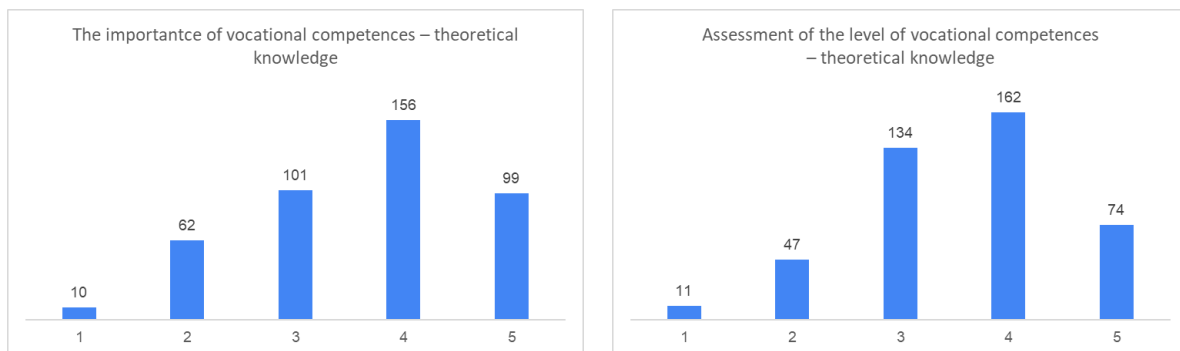

Figure 8 Importance and self-assessment - professional competences - theoretical knowledge

Theoretical knowledge was one of the areas of competence assessed as the least important for employment (3,64); a similar result was obtained in the case of self-assessment (3,56). As regards the importance of this competence and for the self-assessment it was, the most frequently selected category was 4 (app. 37% of respondents).
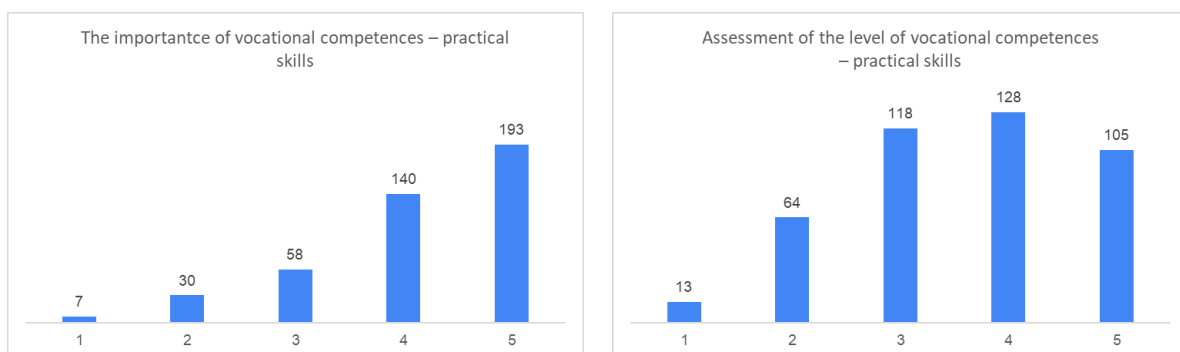

Figure 9 Importance and self-assessment - professional competences – practical skills

Practical skills are the area in which we noticed the greatest differences between the importance for employment and the self-assessment of the level of this competence (4,13 and 3,58, respectively). The dominant value for perceived importance was 5 (45%), whereas for self-assessment the highest response rate was observed for 4 (30% of respondents').
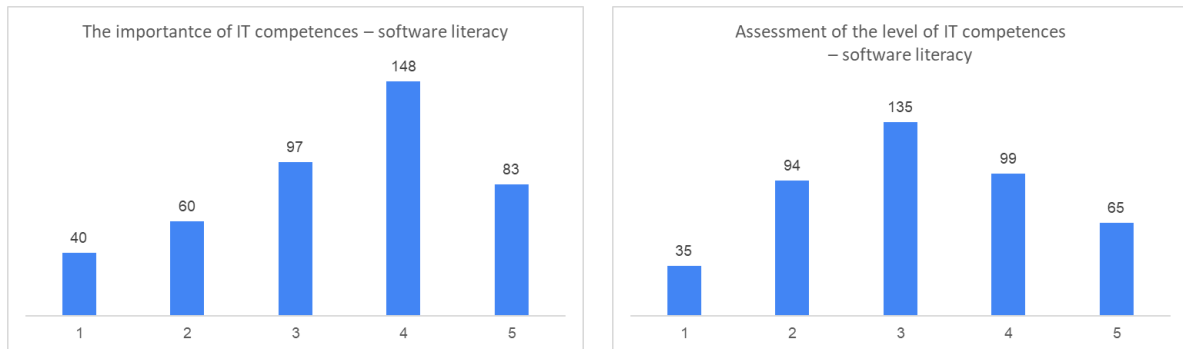
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Figure 10 10 Importance and self-assessment – IT competences – software literacy

Figure 10 presents the results for IT competences in the case of software literacy. This is one of the competences with the lowest mean values - for perception it obtained the value of 3,41 (a dominant value of 4), whereas for self-assessment - 3.15 (a dominant value of 3).

Figure 11 Importance and self-assessment – language competences – knowledge of foreign languages

Figure 11 presents the answers concerning language competences. Jest to kompetencja nisko oceniana pod zarówno pod względem ważności (3,56) jak samooceny (3,36). Dominanta dla ważności to wartość 4, natomiast dla samooceny to wartość 3.
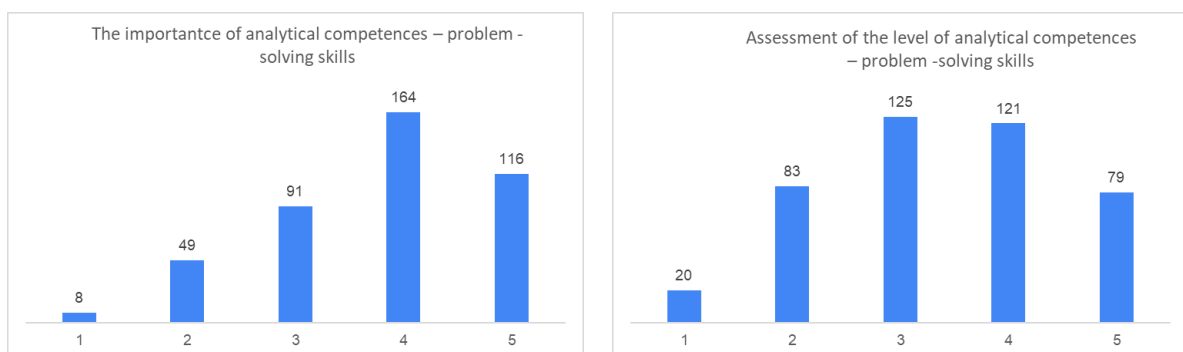

Figure 12 Importance and self-assessment – analytical competences – problem-solving skills

Figure 12 shows the results for analytical competences - problem solving skills. This area obtained moderate evaluations in terms of importance for employment (mean 3,77; a dominant value of 4) but much lower in terms of the self-assessed level (mean 3,57; a dominant value of 3).
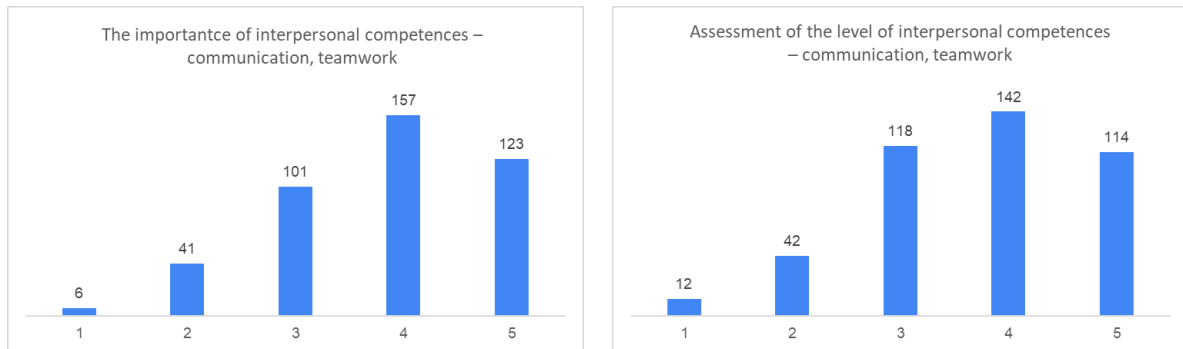
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Figure 13 Importance and self-assessment – interpersonal competences – communication, teamwork

Figure 13 shows the answers obtained for interpersonal competences in the area of communication and teamwork. This is one of the few areas of competence where the perception of importance and the self-assessment of level were close to each other (means of 3,82 and 3,71 respectively; dominant values of 4 in both cases).
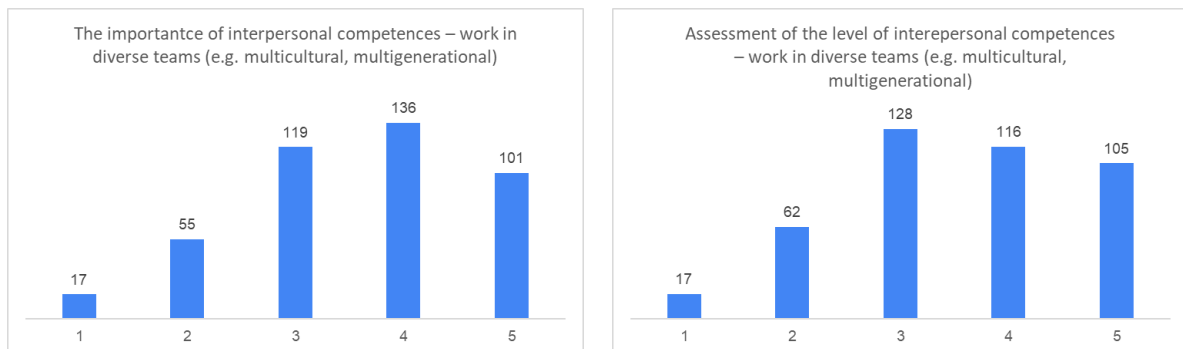

Figure 14 Importance and self-assessment – interpersonal competences – work in diverse teams

Figure 14 shows the results obtained for interpersonal competences in the area of working in a diverse team. As with the previous area of interpersonal competence, the perception of importance and self-assessment were similar (means of 3,58 and 3,54, respectively; a dominant value of 4 for importance and 3 for self-assessment).
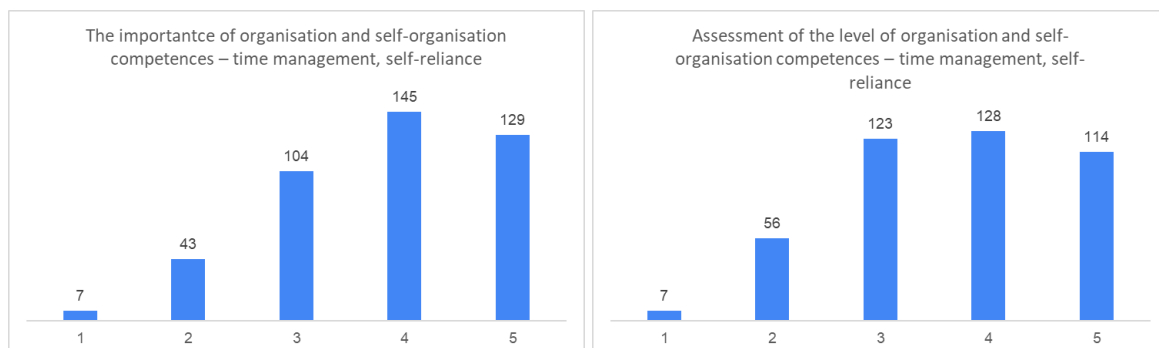

Figure 15 Importance and self-assessment – organisation and self-organisation competences – time management, self-reliance

Figure 15 shows the answers obtained for competences in the area of organisation and self-organisation. This area obtained high evaluations in terms of importance for employment

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(mean 3,81; a dominant value of 4) but slightly worse in the case of self-assessment (mean 3,67; a dominant value of 4).
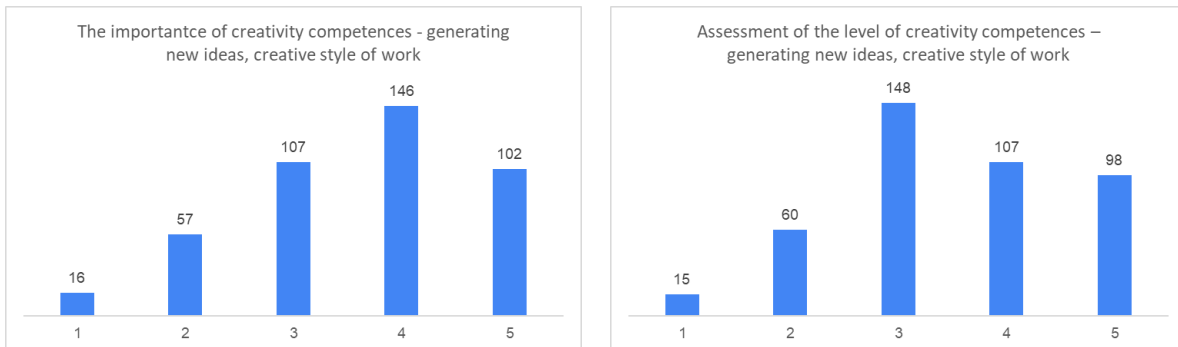

Figure 16 Importance and self-assessment – creativity competences – generating new ideas, creative style of work

Figure 16 presents the answers obtained for creativity competences. The results obtained for perceived importance and self-assessed level do not differ a lot from each other (mean values of 3,61 and 3,50 respectively; dominant values of 4 in both cases).
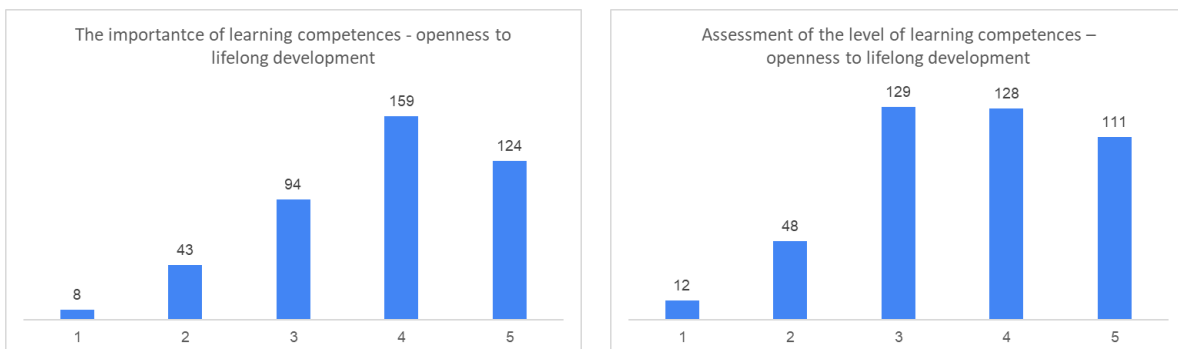

Figure 17 Importance and self-assessment – learning competences – openness to lifelong development

Figure 17 presents the results obtained for learning competences. This area received high evaluations in terms of its importance for employment (mean 3,81; a dominant value of 4) and moderate for the self-assessment of its level (mean 3,65; a dominant value of 3 – 4).
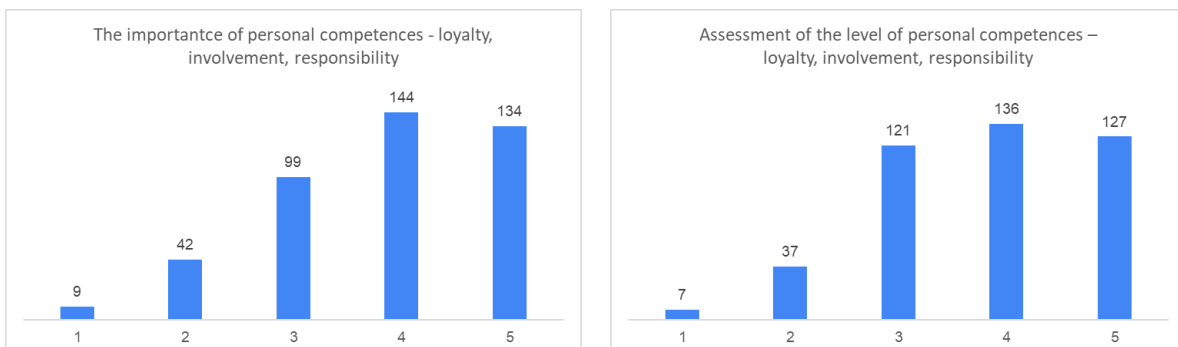

Figure 18 Importance and self-assessment – personal competences – loyalty, involvement, responsibility

Figure 18 presents the results obtained for personal competences such as loyalty, commitment and responsibility. This area received high evaluations in terms of its importance

for employment and for the self-assessment of its level (perceived importance - mean 3,82; self-assessment - mean 3,79; a dominant value of 4 for both).
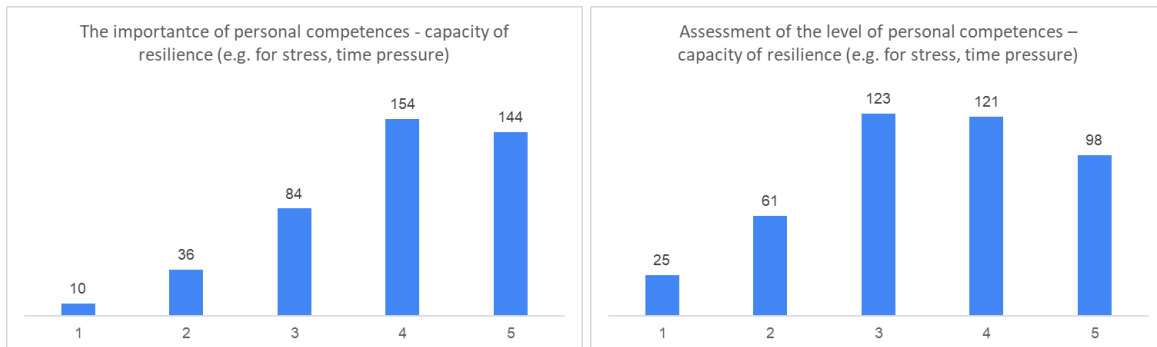

Figure 19 Importance and self-assessment – personal competences – capacity of resilience (e.g. for stress, time pressure)

Figure 19 presents the results obtained for personal competences such as capacity of resilience (e.g. for stress, time pressure). This area received very high evaluation in terms of its importance for employment (3,90; a dominant value of 4) and rather low evaluation for the self-assessment of its level (3,48; a dominant value of 3).

2.2 Further education

The respondents were asked about participation in various forms of further education. The results are presented in Figure 20.

Question 3. In addition to your studies, do you learn anything else/develop in order to obtain additional professional qualifications? If yes, in what form/how do you do that?
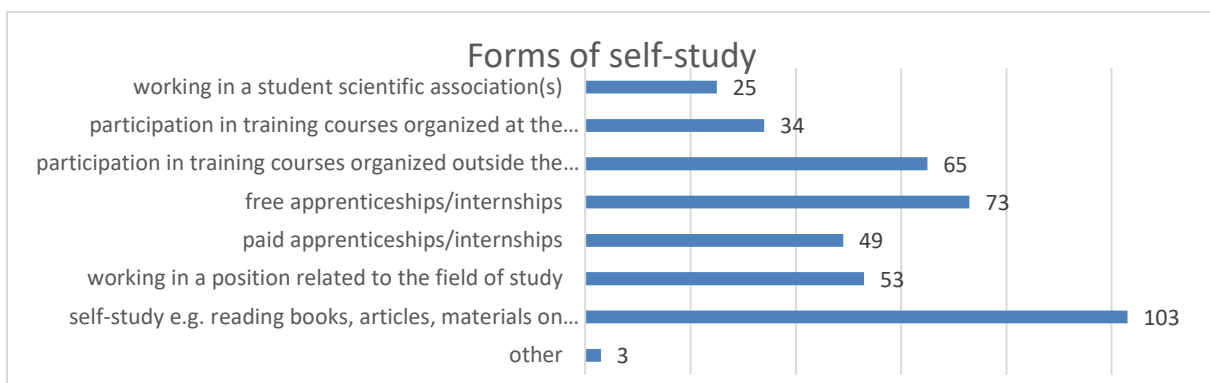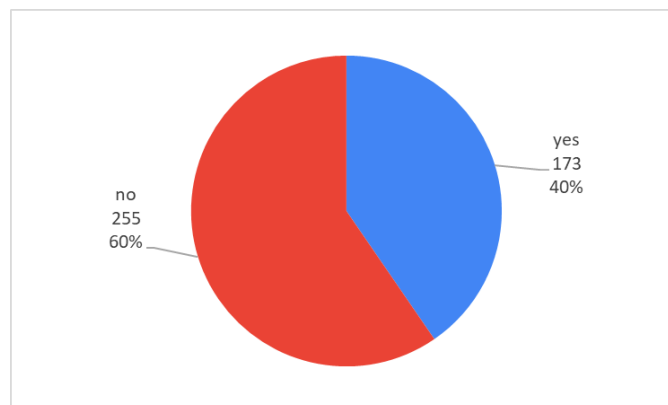

Figure 20 Participation in different forms of further education

According to the research results, 40% of young people undertake further education outside the formal education system. In most cases, they do that by self-study (e.g. they read books, scientific articles, etc.), they participate in internships and training organised by schools.

2.3   Professional career

In the following questions, the respondents were asked to evaluate their preparation for entering the labour market and share their ideas about their future work (in the next 10 years).

Question 4. How do you assess your current preparation for work after graduation? Grade on a scale from „1" (Insufficient) to „5" (Fully sufficient)
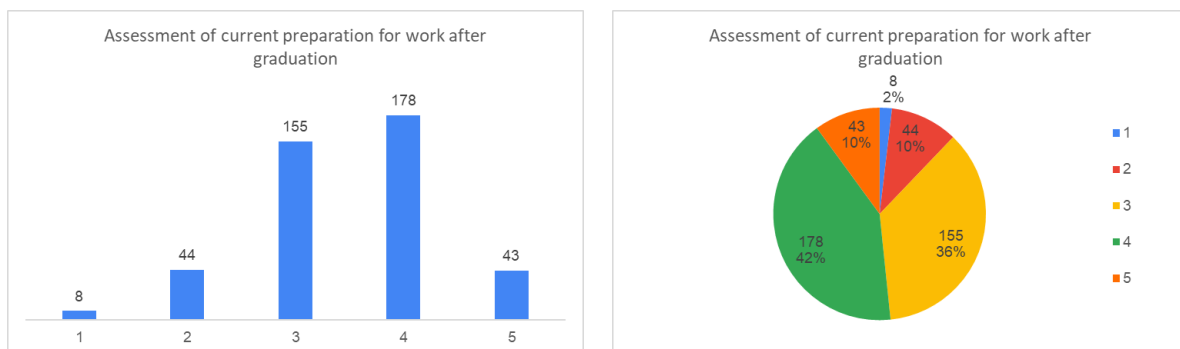
Figure 21 Self-assessment of preparation for professional career

Figure 21 shows the answers to the question about respondents' assessment of their preparation for professional work (mean 3,48; a dominant value of 4), but the results are not optimistic. Only 52% of respondents chose 4 (sufficient) or 5 (fully sufficient).

Question 5. How do you assess the difficulty in finding a job in line with your expectations? Grade on a scale from „1" (Very easy) to „5" (Very difficult).

Figure 22 Assessment of the difficulty in finding a job in line with expectations

Figure 22 presents the results obtained for the question on difficulties in finding a job in line with one's expectations (mean 3,37; a dominant value of 3). Only 16% of respondents chose 2 (easy) or 1 (very easy).

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Question 6. In your opinion, how will the scope of necessary competencies to work in the professions related to the current field of study change in the next 10 years? Grade on a scale from „1" (It won't change a lot) to „5" (It will change a lot).
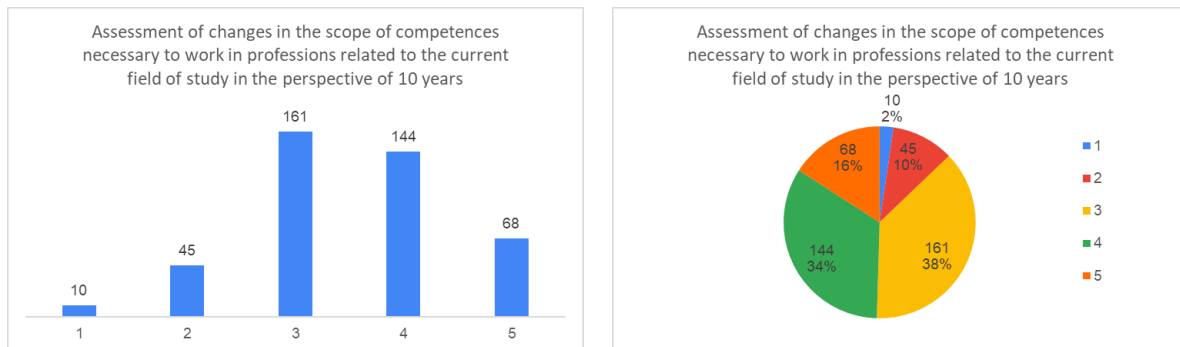

Figure 23 Assessment of changes in the scope of competences in the perspective of 10 years

Figure 23 presents the answers to the question concerning the evaluation of changes in the scope of competences in the perspective of 10 years. Nearly half of the respondents (49,5%) stated that these changes will be big or very big (mean 3,50; a dominant value of 3).

Question 7. What do you think of the development of automation (e.g. new IT systems or applications) and the resulting possible reduction of the demand for employees working in professions related to your field of study? Grade on a scale from „1" (It mainly raises my concerns) to „5" (It mainly inspires my development).

Figure 24 Assessment of the impact of the development of automation on professions connected with a given field of study

Figure 24 presents the answers to the question concerning the evaluation of automation development (mean 3,68; a dominant value of 4). Almost 3/5 of the respondents (59%) stated that the changes associated with developing automation mainly inspire them to develop.

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2.4 Evaluation of distance learning

Another part of the questionnaire concerned the evaluation of different aspects of distance learning as a consequence of lockdown introduced due to the Covid-19 pandemic.

Question 1. Please assess your preferred way of learning within the following forms of classes. Grade on a scale from 1 (Definitely a traditional form) to 10 (Definitely a remote form)
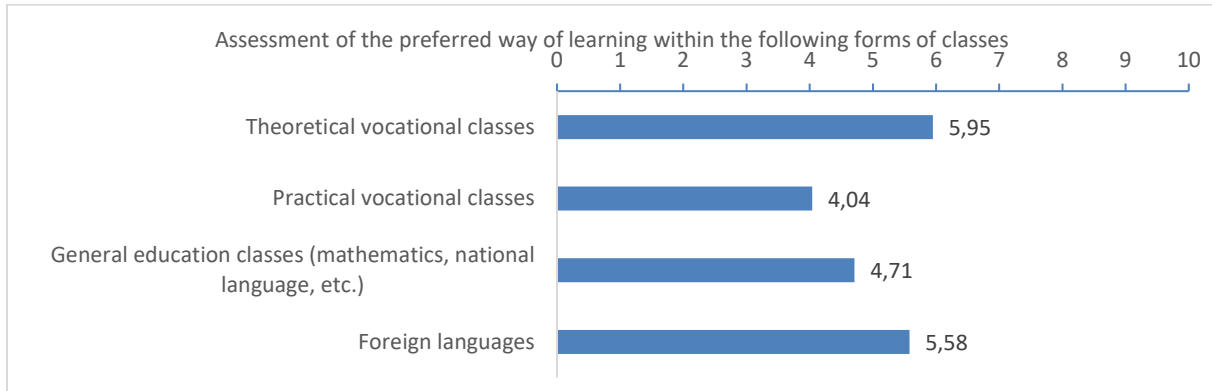
Figure 25 Assessment of the preferred way of learning

The respondents opted for the remote form of conducting lectures and practical vocational classes. In other cases, the result should be considered ambiguous (the values oscillate around 5, which may refer to both ways of learning - traditional and remote).

Question 2. How would you assess the conditions in which your distance learning took place? Please evaluate the following statements. Grade on a scale from „1" (Definitely no) to „5" (Definitely yes)

I had the appropriate equipment (a computer, a laptop)
which allowed me to actively participate in classes
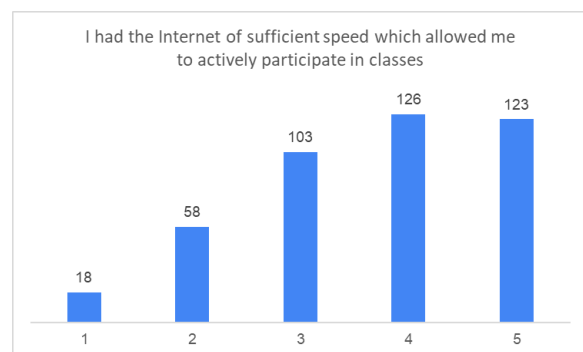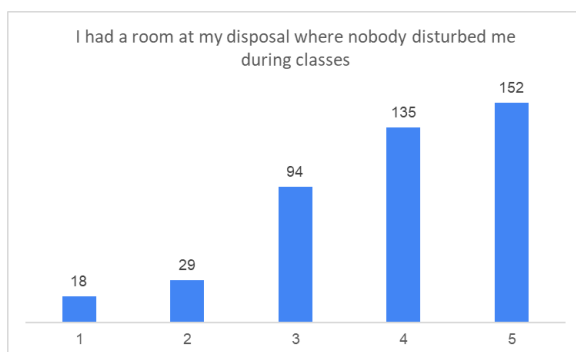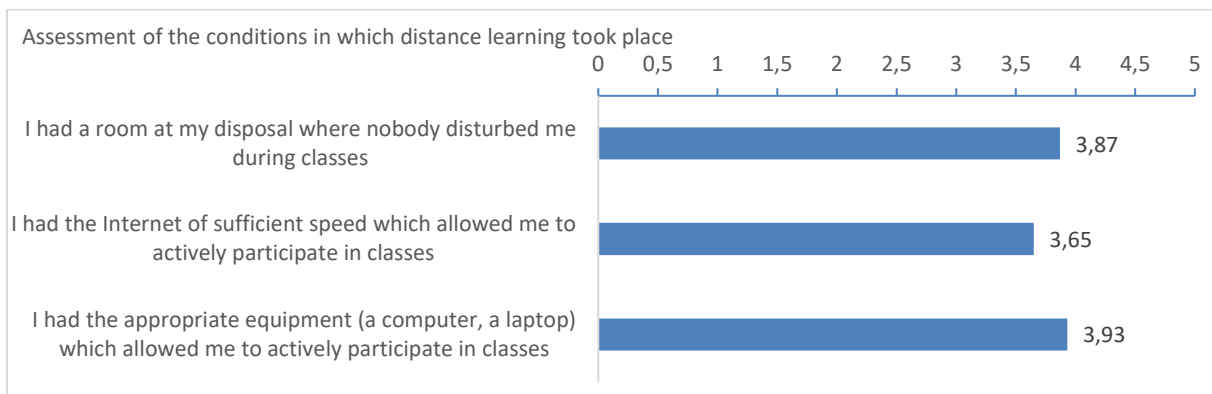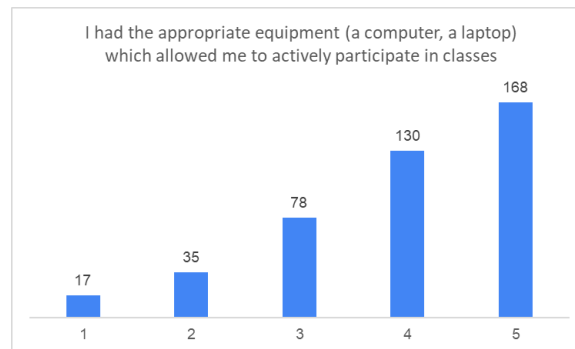
Figure 26 Assessment of distance learning conditions

The respondents evaluated the conditions under which they participated in distance learning in a positive way. The mean evaluation value for all the questions were app. 4 on the 5-point scale.

Question 3. In general, how would you assess your experiences with distance learning? Grade on a scale from „1" (Very badly) to „5" (Very well)
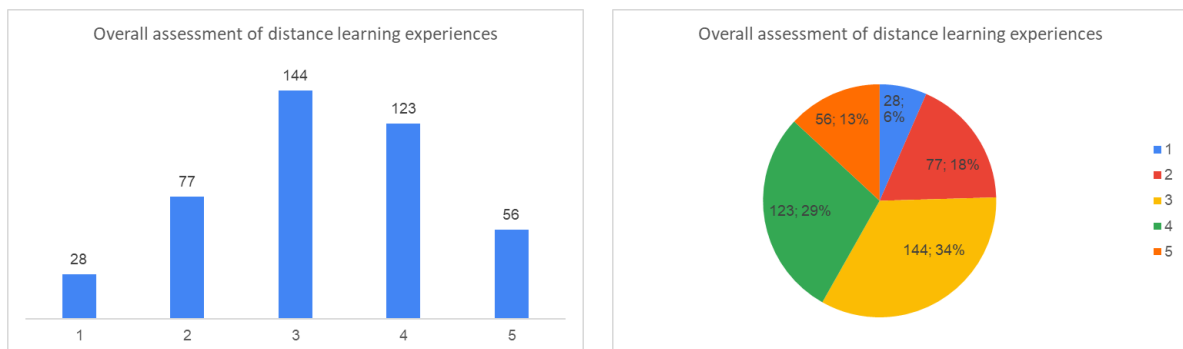
Figure 27 General assessment of distance learning

The respondents evaluated the period of distance learning in a positive moderate way - 1/3 of respondents chose 3 or 5 on the scale (mean 3,24; a dominant value of 3).

Question 4. In your opinion, the preparation of the lecturers was adequate for the requirements of distance learning. Grade on a scale from „1" (Definitely not) to „5" (Definitely yes)

Rather critically the respondents evaluated the preparation of lecturers – more than half of them (51%) chose 3 or less on the scale (mean 3,08; a dominant value of 3).

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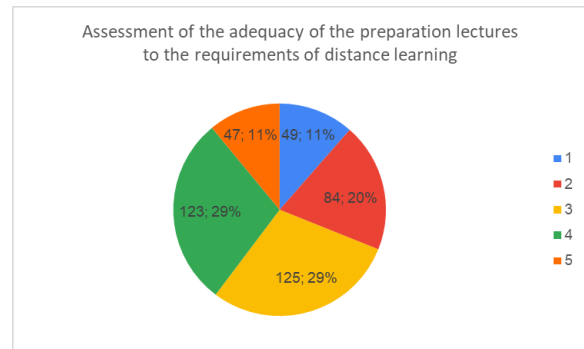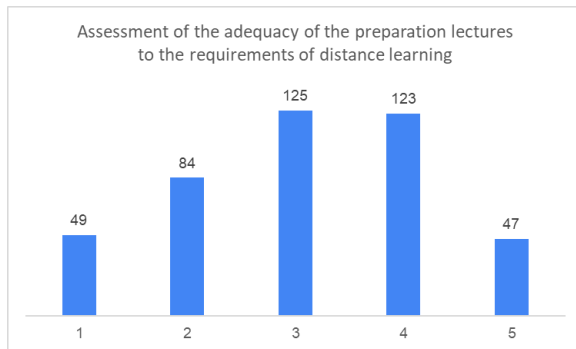
Figure 28 Assessment of the adequacy of lecturers' preparation for the requirements of distance learning

Question 7. To what extent do you agree with the following statements? Grade on a scale from „1" (I definitely disagree) to „5" (I definitely agree)
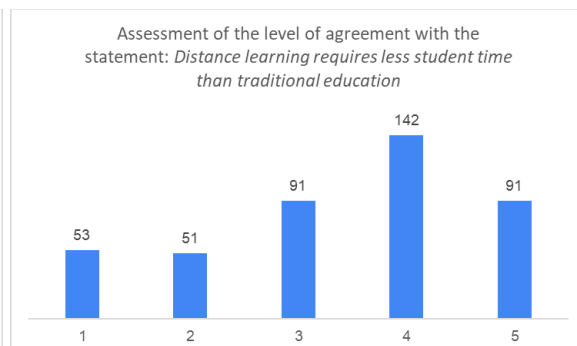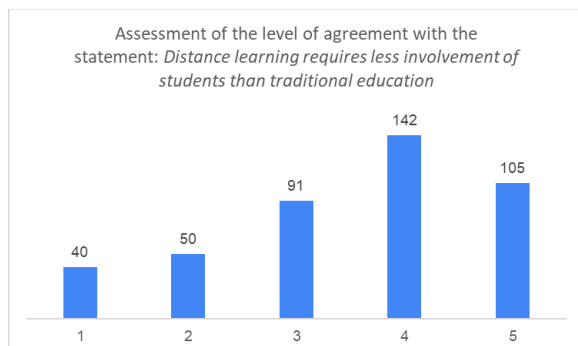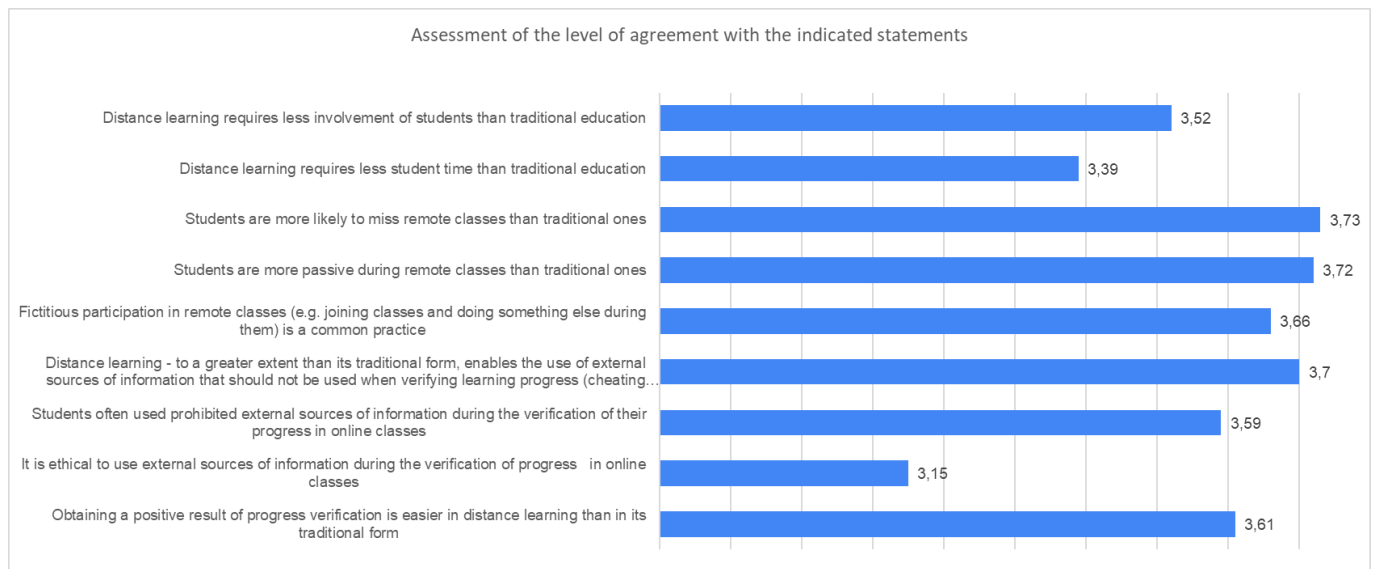
Figure 29 Traditional vs. distance learning – comparison

Most of the respondents agreed with the statements (all means higher than 3,17). The statement they mostly agreed with was the following: Distance learning requires less involvement of students than traditional education (mean 3,80). The statements they agreed with the least was the following: It is ethical to use external sources of information during the verification of progress in online classes (mean 3,17).

3 Qualitative research

The summary of the conducted qualitative research is presented in Table 3.

Table 3 The number of interviews conducted with experts in the area of selected fields of study and countries

Field of study / country	Poland	Greece	Bulgaria	Spain	Total
construction technician	3	3	5	4	**15**
logistics technician	4	3	1	4	**12**
renewable energy technician	3	4	0	2	**9**
Total	**10**	**10**	**6**	**10**	**36**

Field of study / country	Poland	Greece	Bulgaria	Spain	Total
construction technician	3 (1+2)	3 (1+2)	5 (3+2)	4 (1+3)	**15**
logistics technician	4 (2+2)	3 (1+2)	1 (0+1)	4 (0+4)	**12**
renewable energy technician	3 (1+2)	4 (2+2)	0	2 (2+0)	**9**
Total	**10**	**10**	**6**	**10**	**36**

In brackets: teachers/ practitioners.

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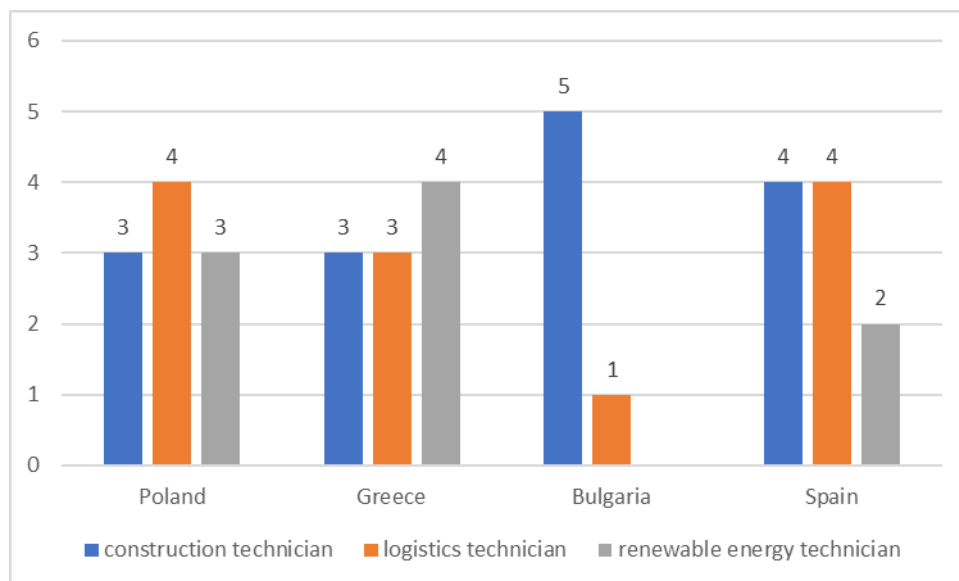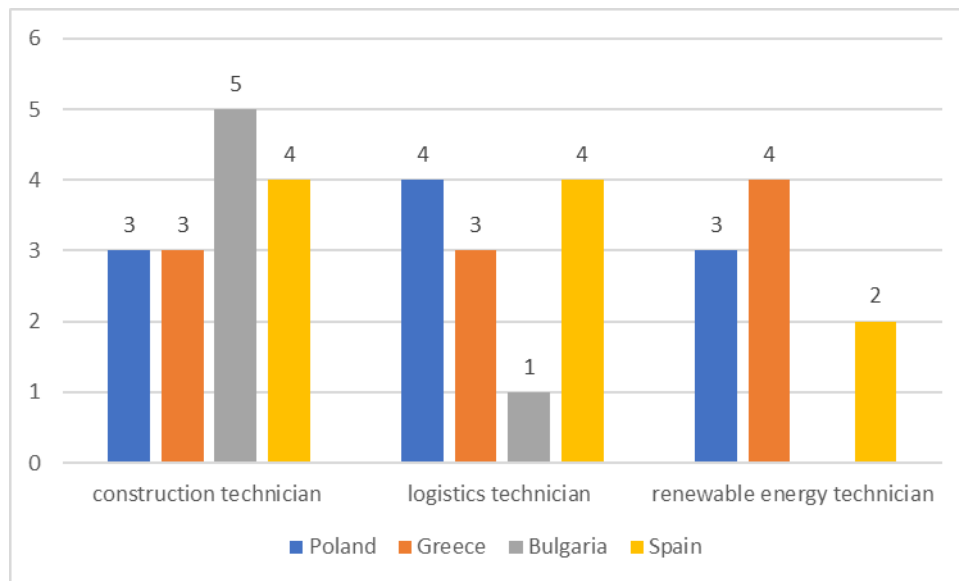
Figure 30 The number of interviews conducted with experts in the area of selected fields of study and countries

Field of study: construction technician

Graduates of this field of study are most often employed:

⸺ in design offices - they learn to design and cost estimates

⸺ on construction sites – as a construction manager assistant, gaining experience

⸺ in offices - work in construction departments, settling housing matters

⸺ in furniture or building material stores

The demand for employees is very high, this applies to all positions. One of the experts (principal of one of the schools) explained that there is no assessment, companies employ everyone because there are no workers from these branches, there is too much demand from the labour market and a small number of students in these professions. First of all, there is a need for foremen (the candidate must be able to read projects, know technologies) and foremen-manager (responsibility for planning work on the construction site, setting up technological processes). Unfortunately, graduates of this field do not want to work on the construction site (estimated only about 20% have such plans).

Occupations / positions for which there is and will be in demand in the future (in the next 10 years):

⸺ site manager

⸺ cost estimator

⸺ designer

⸺ supervision inspector

⸺ junior project managers

⸺ junior site managers

- site foremen
- energy efficient construction – green energy; knowledge of new materials
- architects who certify sustainable projects and Sustainability Coordinators
- project manager for 3D models
- construction technicians (hydraulic and road construction) and geodesy technicians

The demand will be very high; Poland has a weak infrastructure compared to other countries – it will keep catching up for a long time (EU funds have a large impact on the demand); the need for foremen, foremen-managers.

Bulgaria: teacher: in general, the demand in Bulgaria for people with only secondary level education is very low in the labour market. Practitioners: the high demand not just for workers with a third qualification as "construction technician", but even more for workers with a second-degree qualification such as bricklayers, plumbing technicians, electrician, road construction technicians, etc.

The impact of technological changes

There is and will be a very large impact of the development of modern technologies in the area of the software used in the industry and keeping up with changes. The changes enforce / will enforce knowledge and skills in the field of new technologies, materials (keeping up with changes) and operating new machines / devices (e.g. road works). Within 10 years, no current competences will lose their value, no revolutionary changes will occur; there will be new materials and technologies and it will be needed to keep up with it. The changes of the technology bring significant changes in the ways of building, construction and nature and use of the materials. This is why the strong practical and learning skills are of paramount importance.

Schools do not keep up with the progress of technology. Big problems: the lack of professional literature that follows its progress, and also the teachers training should be up to date but not always possible. Those are the main reasons which consequence is that the education is not following the global development.

Main challenges

Poland: The main challenges in terms of the development of the direction in the field of professions / positions of the future.

- knowledge of cost estimating and design software (e.g. AutoCAD tools)
- emphasis on practical vocational training - creating a real construction studio at the school

The main challenge is the lack of practical preparation, schools do not organize good practices; apprenticeships on the construction site are needed - but it must be remembered that the workers on the construction site do not have time for apprentices; there should be students at the construction site together with the vocational teacher.

Greece: Feedback from the companies who consider that their construction technician does not meet their needs for what they need - they have neither theoretical nor practical knowledge. Also, the teachers should be constantly up to date with all the changes that are happening so fast that they do not arrive to be updated because there is no scheduled time for professional development in their working time - that is why education is so far behind technology development and changes in the market.

Spain: Technological progress affects the development of new programs, new technical systems, especially in the work, you have to be constantly prepared and updated. The education system is very traditional and it does not evolve as fast as the market is. Teachers should know and teach about specific job positions and concrete tasks and functions students can apply for in different companies. What is most lacking is to make the students know what the sector really is like, the regulations, possible functions within the company. It is very important to know the functions of the job very well before entering the labour market.

Bulgaria: the incapability of the schools to provide each of the enrolled students with an individual work- practice in real environment. Because of that, students often lose interest and motivation and have no direct contact nor involvement in the business sector they are studying to become "a professional" in. Not enough practice in the curricula in VET schools.

Cooperation with practitioners and monitoring of the labor market

Poland: Schools do not monitor formally the situation on the labor market. They cooperate with local employers, but not in a systematic and permanent manner, they help students in organizing apprenticeships. The curriculum is very rigid, the teacher cannot modify it. Much depends on the teacher himself, who wants to provide additional, up-to-date content.

Greece: The majority of the schools I am working with, have mechanisms in order to monitor the market needs and prepare the graduates accordingly. Instructors just like me, are acting as consultors upon the subject.

Spain: Director of vocational school explains that all occupational standards are based on research among employers who have written their needs - every change in the curriculum is accompanied by the needs of the labour market. There are not enough practical classes, just 80h/year and that currently new programs are being written and it will increase the number of practical classes and connect theoretical subjects and practice - all theoretical parts will have to include a practical part.

Practitioners – the cooperation between education and the labour market is very deficient in this area.

Bulgaria: the monitoring is rather not existing. Primarily they carry out statistics on the admission rate of graduates in construction disciplines in higher education institutions, but not on the demand nor employment rate of the graduates. The total number of hours for vocational education is starting to decrease in the recent years and are insufficient, which is a step back for the progress of VET in Bulgaria.

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Important competences

Key competences for increasing the chances of graduates in the labor market:

— work organization and time management

— attention to detail

— good comunication

— Software knowledge

— leadership skills

— Learning Skills, desire and attitude into learning

— Analytical skills

— creativity skills

— IT competences and knowledge on different software and programs are needed: Autocad, Revit, 3D Models

— social skills (if dealing with other clients or companies)

— MS Excel skills

Justification: soft skills are necessary for finding and keeping a job and for promotion. Knowledge of the use of software (for cost estimation, design) is necessary for both the cost estimator, designer and construction worker who must be able to read projects / cost estimates.

According to practitioners, the most important factors for successful work in the construction industry are willingness to work and manual skills, as well as a sense of responsibility for people (knowledge and application of health and safety rules), time (execution of the order within the agreed time) and money (execution of the order within the assumed budget). The ability to read projects, the ability to work in a team and good organization of own and team work significantly increases the chances of finding a good job.

Poland: In technical secondary school students are still drawing / designing by hand, while knowledge of dedicated software is and will be required on the labor market. Other required competencies will remain unchanged.

Graduate preparation and curricula are not adapted to the needs of the labor market;

— graduates cannot read construction drawings and projects

— lack of practical skills in the performance of works (not enough practice during the education)

They are adapted in terms of good theoretical preparation, knowledge of technological processes.

Spain: the preparation of the graduates is insufficient. There is a big lack between real needs of the market and use of modern technologies and the current education system. Students do not have real knowledge about the situation in the companies and actual job positions they can apply. They do not know where to look for information or where to start. There is a lack

of real knowledge of the profession and what is really done in each job, so that one can make the right decision when applying for a job.

Future competences

The concept of "future competences" in the context of graduate preparation:

- **Poland:** ability to cost estimates using dedicated computer programs, ability to design, draw using software (eg AutoCAD), ability to "read" drawings created in computer applications
- **Greece:** learning skills, openness to lifelong learning, digital competencies
- **Spain:** competences for problem solving, openness for life- long learning and being open for change, creativity
- **Bulgaria:** adaptation and non-standard logical thinking and application in practical exercises

Soft skills and training

Poland: There is no assessment of soft skills. There is no additional offer that would allow students to develop competences important on the labor market.

Greece: Usually, once a year the students undertake specific assessment tests in order to determine the status of their soft skills. The results are used in order to update the curricula and guide the student accordingly in order to become competitive in the market.

Spain: W programie nie są uważane jako obszar priorytetowy. There is no special evaluation procedure.

Bulgaria: They do not have any means nor tools for that. A contributing factor for the soft-skills assessment are the extra-curricular activities organized for the students and as well the international internships.

Pandemy

The COVID-19 pandemic did not change the competency requirements in the construction industry. It certainly had a negative impact on the level of education (remote learning has definitely lowered the level).

Summary

Similar areas in need of change were noticed in all countries. This mainly concerns outdated curricula and rather sporadic than systemic cooperation between schools, practiners and the labor market. Interestingly, in all countries, school representatives were less critical than practitioners. Practitioners pointed to the unpreparedness of graduates, lack of knowledge of the characteristics of the profession they chose, and lack of the necessary practical skills. Most of the respondents indicated the present and future enormous demand for construction graduates. Interesting competences were indicated which, according to the respondents, can

help graduates succeed in the labor market. Much emphasis was placed on soft skills, including openness to learning.

Field of study: logistics technician

Graduates this field of study are most often employed:

- as a junior logistic specialist in logistics companies or logistics departments of companies from any industry, e.g. Junior Supply Chain Analyst, Junior Supply Chain Engineer, Junior Procurement Analyst, Junior warehouse manager
- in the organization of transport processes
- in the process of planning of transport
- in the process of planning production

The demand for employees is increasing, e.g. in home-improvement and construction stores, in warehouses, in transport companies. Logistics is a broad concept, it offers many work opportunities; the greatest demand for the positions: clerk, warehouse service, planner, junior logistics specialist. Generally there is a very large demand for professions related to logistics, or more broadly the TFL industry (transport, forwarding, logistics).

Professions / positions for which there is and will be demand in the future (in the next 10 years):

- Supply Chain Analysts
- forwarder (related to the dynamic development of e-commerce)
- handling internet orders
- areas currently served
- purchasing planning
- data analyst (observes the increase in demand)

Logistics is developing towards servicing large-area warehouses and transport logistics; modern technologies have a huge impact. The most required positions currently are, and will be in the future: warehouse operatives, road drivers and load managers who are responsible for planning and managing logistics, warehouse, transportation and customer services, directing, optimizing and coordinating full order cycle and liaising and negotiating with suppliers, manufacturers, retailers and consumers. All positions which involve use of artificial intelligence will be highly demanded, because in logistics there are going to be a lot of changes regarding technology.

The impact of technological changes

The impact is big, however, schools do not keep up with technological changes, students should know many of them, unfortunately they will not get to know them at the school. Knowledge of the software used in the industry is essential.

The main challenges

Poland: adapting the curriculum to the realities of the modern world, cooperation of the ministry with schools and employers in the field of joint development and modification of curricula. Lack of qualified teaching staff. In the area of the curriculum: knowledge of software used in logistics (e.g. for invoicing, issuing orders), knowledge of the operation of IT systems used in logistics, work planning, setting priorities, good organization of own work.

Greece: The limited practical experience that the schools offer and the theoretical oriented nature of the courses. The COVID pandemic with all the remote teaching made the situation worse since any possible hand on practice was not available. The online training, in the form they have nowadays pose challenges to the preparation of the new graduates. The lack of technical equipment on behalf of the students and the teachers and the lack of the appropriate material fail to prepare the new graduates appropriately with the required skills & competences.

Spain: Practice knowledge of teachers – if in education and training teachers don't have direct experience in the field, just theoretical knowledge students can't be well trained. It's needed to invest in developing of the student's attitude and transversal skills and set good theoretic bases, the rest can be learned in practice.

Bulgaria: The school system is lacking attentiveness and care for the actual knowledge and analytical skills of the students. Education system is more focused on the quantity then on the quality of education provided. High expectations of graduates in terms of salaries.

Cooperation with practitioners and monitoring of the labor market

Poland: the school monitors; companies come forward with job offers. The program is not modified, it focuses on the organization of transport, there is no logistic management (city, hospital, military logistics); the core curriculum has a direct impact on the scope of the exam, which cannot be changed by the school on its own. The curricula are tailored to the needs of the company, mainly in terms of theoretical knowledge: knowledge of processes, planning methods; there is a lack of knowledge regarding the operation of WMS (warehouse system) and ERP systems - students do not know the logic of these systems.

Greece: Unfortunately, there are no incentives in order to establish any cooperation with schools. The graduates come to the labour market with a very limited scope of the reality. The most graduates are mainly focused to the theoretical part of the logistics area without taking into consideration the real needs of the market. The practical skills are missing. The school mainly focus on building theoretical skills.

Spain: There is a lack of communication and cooperation established between companies and technical schools on a regular basis. Some companies did receive interns and normally they were employed later on, but participants pointed out there was no "dialogue" between education and companies. All participants agreed that the technical skills are not that much important as it is the attitude and transversal skills of the worker. The only thing it was pointed

out for medium and higher positions was the foreign language level (especially English), but the rest it can be learned and trained along the process.

Bulgaria: There is a lack of cooperation with any technical schools, not only in this business area.

Important competences

Key competences for increasing the chances of graduates in the labor market:
- the attitude
- ability to work in a team
- time management
- knowledge of new solutions, systems functioning in logistics
- communicativeness
- creativity
- analytical - problem solving
- knowledge of information systems used in the industry
- soft skills (work organization, team work, resistance to stress)
- getting rid of the feeling of having to compete
- the ability to analyze and evaluate logistics processes
- knowledge of quantitative methods and a spreadsheet
- knowledge of foreign languages
- openness to lifelong development

What will change in expectations in the next 10 years:
- IT skills and analytical skills
- the ability to search for information
- knowledge of software dedicated to the logistics industry
- greater emphasis on the use of a foreign (industry) language
- greater importance of communication skills
- usage of computer applications related with the industry and keeping up with changes in this area
- service of large-format stores
- ability to make quick decisions
- resistance to stress
- personal skills (loyalty, responsibility), Interpersonal skills, learning skills
- creativity and problem solving
- ability to manage multiple projects
- less importance of theory, knowledge learned by heart that can be found on the Internet
- there are hardly any competencies that will lose their relevance. Specialist competences may lose their importance - when selecting an employee, companies

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are guided by the candidate's personality profile, not his experience; it is important to match the position in terms of personality; experience and education are still important, but not as much as they used to be.

Future competences

The concept of "future competences" in the context of graduate preparation:

– **Poland:** ability to work in a team, creativity, the ability to quickly solve problems, knowledge of industry foreign languages, the ability to deal with stress, the ability to work under time pressure, self-organization and self-discipline, automation, work in international teams, related to the development of information technologies - knowledge of software used in industry and keeping up with changes in this area, competences related to the e-commerce industry

– **Greece:** problem solving, IT literacy, creativity skills, openness to lifelong learning, communication skills

– **Spain:** transversal or soft skills, the importance of the attitude and readiness to learn, teamwork and communication

– **Bulgaria**: soft skills as imagination, good time management and autonomy for problem solving

Soft skills and training

Poland: There is no assessment of soft skills. There are additional classes, e.g. in the field of logistics and forwarding, carried out in a group, or developing soft skills. Unfortunately, the students do not want to take advantange of them. During recruitment for work, an assessment is carried out using simulation techniques (simulation of a specific situation and assessment of the candidate's behavior) or tasks checking the ability to organize work, set priorities; currently, the results of the soft skills assessment do not affect the employment decision (no job candidates), but do affect the proposed position.

Greece: There is no assessment of soft skills. There is no additional training. However, they are more than welcome to have our advice on further training or participate on additional courses (online/offline). In practice – For every position by interviewing them with specific standards that have been set from our HR dept. The results of the assessment play a crucial role since it is the first step for the continuation of the recruitment process.

Spain: Practitioners: All experts commented there is no special tool for assessment of soft skills during the hiring process. All of them affirm that soft skills are "the key" and those competences are being observed and verified during the interview, but there are no special methodologies nor procedures they use.

Bulgaria: Nie ma systemu do oceny kompetencji miękkich.

Pnademy

The COVID-19 pandemic has caused students to "unlearned"; after the pandemic, they returned to school with withdrawn in terms of knowledge and skills. The pandemy had a big

impact for the practice, the key is the ability to work remotely (in many places, remote work has already been introduced permanently); in addition, the sender / receiver requirements have changed, resulting in a lot of layoffs or shifts in logistics companies; other goods collection systems appeared; employers require specialization. The Covid-19 pandemic has increased demands on workers; the automotive industry reduced jobs, a large group of people looking for a job appeared; companies are very careful about hiring new employees; however, these changes should be of a temporary nature. Due to the vulnerabilities of the logistics sector, even more graduates and individuals with strong analytical and creational skills are required. Pandemic had an immense impact on the competences of the students and especially on analytical skills, practical skills and creativity skills.

Summary

Similar areas in need of change were noticed in all countries. Strong emphasis on shaping analytical and personal competences, as well as attitudes towards work and personal development. In all countries, a problem with communication between school and practice and the labor market was identified. Potentially high demand for graduates in various areas, but analytical competences are needed everywhere, above all the ability to solve problems, resistance to stress, work under time pressure.

Note: in the case of Bulgaria, the respondent referred to the situation of university graduates rather than vocational school graduates.

Fields of study: renewable energy technician

Graduates of the faculty are most often employed:

- fitters in companies dealing with the installation of photovoltaics (about 40%)
- fitter, contractor teams
- equipment service technician, service and maintenance departments (service technicians)
- data analyst
- junior project managers
- junior renewable energy consultants
- system maintenance personnel
- service support field engineers
- wind turbine maintenance technician
- junior renewable energy and grid connection consultant

The demand is very large: currently there is a great demand for photovoltaics, solar panels, heat pumps, solar panels, energy storage. Professions: wind turbine technician, site manager, heat pump and ventilation department, Junior Project Managers, Junior Renewable energy consultants, System maintenance staff, service support field engineers, renewable energy technicians

Occupations / positions for which there is and will be in demand in the future (in the next 10 years):

- – fitter of renewable energy devices
- – service from offshore farms (offshore wind farms) with different working conditions, procedures and requirements
- – service and maintenance department or design department.
- – Renewable energy consultants
- – Project managers
- – Wind Turbine Maintenance technician
- – Renewable energy and grid connection consultant

The impact of technological changes

While studying in a technical school, students are to learn the basics, while technological changes will be learned in companies that employ them. Certainly, the knowledge of software (e.g. for design) is important. The increasing role of electronic work tools, e.g. tablets with instructions or VR training. Many trainings prepared for global organizations are in English. English, which automatically creates competence requirements; ability to adapt to working conditions (e.g. new procedures) or to work in a team. The changes of the technology are the reason that the software literacy and openness to lifelog learning will increase their significance in the future

The main challenges

Poland: equipping schools with teaching aids suitable for the field of study (possibility of simulation, examination positions), emphasis on practical vocational training. Improving the knowledge of foreign languages, especially English, much more complicated procedures and requirements on marine farms. The challenge will be the knowledge of educators, their openness to knowledge and practical experience as well as school-company cooperation on joint educational projects (preferably practical).

Greece: The main challenge is the technological advances of the sector and the changes that brings to the routine and the way of the function of the industry. To keep up with the needs of the market and always be informed and stay updated about the technological changes.

Spain: Practice knowledge of teachers – if in education and training teachers don't have direct experience in the field, just theoretical knowledge students can't be well trained. It's needed to invest in developing of the student's attitude and transversal skills and set good theoretic bases, the rest can be learned in practice.

Cooperation with practitioners and monitoring of the labor market

Poland: It is companies from the industry that report their needs and are looking for potential employees. The school does not monitor the demand - this is a small market. The learning

framework is very rigid, the system is rigid and difficult to modify. There is a great need to increase the emphasis on practice. The industry is young and dynamically developing, teachers of vocational subjects must constantly update their knowledge and look for materials on their own.

Greece: Our school has an extensive network in the labour market, consisted by SMEs and large enterprises. We are constantly communicating with these enterprises and monitor the needs and the challenges of the market. There is a close collaboration with the aforementioned power suppliers. This help us to evaluate the market demand in real time with direct information for great employers. We modify the curriculum every year according to the new technics and demand of the market. Our in-house team, annually evaluates the training material and proposes the appropriate updates. Practitioner: Unfortunately, not. However, the HR department constantly looks for new graduates by the largest VET providers in Greece and have frequent discussions for establishing a strategic cooperation between the schools and our organization.

Spain: Participants agree that there is a lack of cooperation between schools and the labour market when it comes to special assessments regarding demands from companies. The main reason is that the demand for those profiles is so high that there are almost no criteria when it comes to employment. Good cooperation with companies at the local level that employ virtually all graduates of the profession. The curriculum is not bad but you cannot learn everything in the workshop facilities at the school, they cannot see the production, no clients or suppliers. A large part of the practical knowledge cannot be transferred in school conditions, it is necessary to work in the field.

Important competences

Key competences for increasing the chances of graduates in the labor market:

- mathematical competences
- openness to development and willingness to constantly learn
- manual dexterity
- practical abilities
- the ability to adapt to reporting and procedural requirements related to the operation of wind farms
- literacy software
- creativity
- time management skills
- interpersonal skills
- Facility Maintenance, Energy Promotion and Efficiency, Building Certification, System Upgrade Options, and Energy Efficiency
- personal relations in the work environment; coordination, teamwork, organization and punctuality.

What will change in expectations in the next 10 years:

- openness to development and willingness to constantly learn
- knowledge of various technologies and operating procedures
- software literacy, IT skills
- IT literacy
- problem- solving skills
- soft skills - especially being flexible, resisting, good coordination and teamwork
- No competencies will lose their relevance. Basic competences (e.g. in the field of electricity) will be important regardless of the direction in which the industry develops.

Future competences

The concept of "future competences" in the context of graduate preparation:

- **Poland:** Ability to design installations (and not just assemble ready-made projects). Related to the development of modern technologies, the ability of logical and cause-effect thinking, manual skills and the use of power tools, skills and knowledge about health and safety, first aid
- **Greece:** software literacy, openness to lifelog learning. IT skills, interpersonal skills
- **Spain:** competences of the future are strictly related to Renewable energies – all technical skills but also the general ones: culture, habits, awareness of the energy waste and efficiency; reduction of CO_2 emissions.

Soft skills and training

Poland: There is no assessment of soft skills. There are no extracurricular activities. In practice, the assessment of soft skills is important in the recruitment process. People who are not very communicative, individualists, withdrawn people are not recommended to work in teams. We also assess the ability to take responsibility for others and the ability to cope with difficult situations, e.g. threats, which is particularly important when working with electrical devices.

Greece: With inhouse test of soft skills assessment- computer based one- once in a year. We use the results of the assessment in order to map the evolution of our students and guide them accordingly towards building the proper soft skills. There is no additional training.

Spain: although the soft skills are very important for their profession, there is no special place in curriculum with this kind of content. As additional activities, teachers propose catching up with the dual system of Education and participation in Erasmus + programs/exchanges for students in order to improve their competences.

Pandemic

The COVID-19 pandemic has not changed the competency requirements in the industry. It certainly had a negative impact on the level of education (students fell back). Working in the profession has nothing to do with remote work. The COVID-19 has mainly increased the necessity for software literacy. The remote nature of studying and working has raised the demand for solid IT skills. These are permanent since everyone understood the necessity of the software literacy.

Summary

All interviewees were aware of the "novelty" of the direction and high dependence on modern technologies. Relatively better cooperation between school and practice compared to other fields of study - the reason is probably the very high market demand for graduates of the faculty and activities carried out by companies. Openness to constant development and willingness to learn were emphasized as a key competence, apart from analytical and IT competences. Great concerns are related to the insufficient preparation of vocational teachers and the difficult for schools to keep up with the development of technologies used in practice.

Note: no interviews in this area by the Bulgarian partner.

General observations

Participation in research - high-class experts from schools and practice.

Assessment of soft skills - it is unlikely to occur in schools, in practice it is important at the recruitment stage.

Training - sporadically, rather in the form of special projects (eg Erasmus + mobility) than a systemic solution.

Practitioners cooperate with schools - sporadically, rather few initiatives on both sides. The exception is the area of renewable energy sources (huge demand for graduates.

Monitoring the demand for professions - sporadic.

Emphasizing the importance of analytical and soft skills. Attitudes towards continuous development and openness to improvement are of great importance.

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