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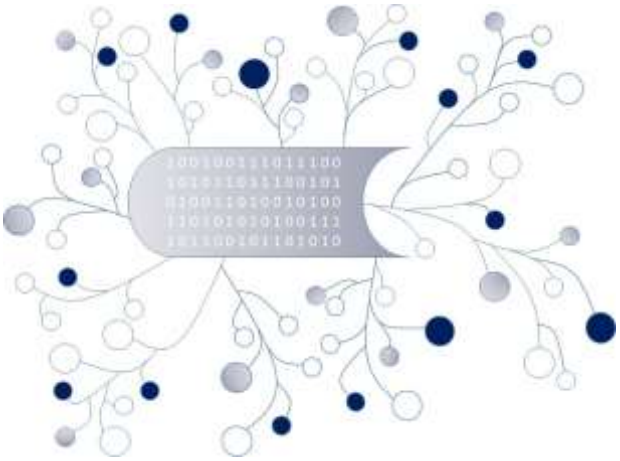

DigI-VET

Fostering Digitization and Industry 4.0 in vocational education

2018-1-DE02-KA202-005145

DigI-VET research and evaluation results

UPB – Jennifer Schneider

Project Title	*DigI-VET*
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Content

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I Evaluation Structure of the DigI-VET-Study

Marc Beutner

An evaluation approach is characterised by evaluation objects, evaluation subjects and valuing processes (cf. Beutner 2018, p. 37). The evaluation approach of DigI-VET mainly focusses on descriptive evaluations but also addresses explanative and prescriptive evaluation aspects (for the different approaches see Beutner 2018, p. 83). It is integrated a project evaluation approach but offers an own evaluation study which is as a combination of single evaluations (see as well Beutner 2018, p. 89).

The DigI-VET study offers insights into digitisation and industry 4.0 in Cyprus, Germany, Romania and United Kingdom.

The research activities combine desktop research with empirical research and therefore offer a combination of qualitative (cf. Flick 2000 and Flick / Kardorf / Steinke 2000) and quantitative approaches (cf. Mummendey 2014 sowie Raab-Steiner / Benesch 2015). The empirical research was conducted in two ways (a) a quantitative study based on multi-language questionnaires and (b) a qualitative interview study with Industry 4.0 and digitalisation users and providers. Therefore, questionnaires according to the target groups had to be created and also interview guidelines had to be designed. The research of DigI-VET was the basis of all work in DigI-VET and led into a research report and a best practice database with showcases on the website.

The qualitative interviews were based on a criteria-oriented approach to have a chance to get comparable information which could also be used to the showcase database of DigI-VET.

All interviews were conducted in mother tongue of the participants to allow a secure situation and a broader variety of answers. This also means that the answers had to be translated into English to offer a basis for the comparison and to make it assessable for all partners. For the analysis of the interviews we used the approach of content analysis according to Mayring (c.f. Mayring 2000). The average duration of each interview was about 15 minutes. All interviews were semi-structured. This helped to collect data based on an interview guideline. The core aim was to get direct information about the participant and his or her context. This was addressed to delineate personal meanings and experiences (Flick 1998; Strauss / Corbin 1998). An adequate documentation of the interviews was ensured by using and compiling data tables as

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well as a structured approach via argumentation tables. On the basis of the approach of Mayring content analysis was used to analise and categorise the data derived from the interviews. In DigI-VET trustworthiness is an important issue. Therefore, all interviews were assigned and analised by the same persons in the project team. All interviews were conducted by team members who agreed on a common ways and strategy to conduct the interviews. This happened to make sure that always the same information were provided and the same design of the interview was applied. All categories that emerged from the data are consistent with the understandings of the participants. Consequently, validity it can be stated for the study. All interviews were conducted in 2019. The interviewed persons, had all an educational or economic background and were situated in the different partner countries. In total 20 interviews were conducted in the four partner countries.

The second part of the study is designed as an explorative quantitative research study and offers information concerning:

- The use of definitions of digitisation in the partner countries
- The challenges and opportunities which come along with digitisation activities
- The essential focus of digitisation
- The persons and groups which are responsible for digitisation aspects
- The awareness of industry 4.0 and the term itself in Europe
- The importance of digitisation and industry 4.0 with regard to today and the future
- Skill and competence sets which are important for digital change in society
- Estimation profiles of digitisation and their change in the future

This part of research was conducted between September 2020. The following chapter explains the research results and shows the particularities of the partner countries of the DigI-VET consortium.

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II The DigI-VET Study - Insights in the research results

Marc Beutner

To provide an insight into the quantitative research results we will have a closer look at the different countries involved in DigI-VET. This will help compare the answers in the different European countries and takes also the differences in life standard and IT in the countries into account. An aggregation over the countries could be misleading here.

II.I Insights into the results from Cyprus

At the beginning we will focus on the results from Cyprus.

Having a closer look at the participants of the Cypriote study it can be said that 96 participants took part in it. 38% of the respondents were female and 56% were male. Moreover, 6% would rather not to tell concerning their gender.

38% of the participants were under 30 years old and 6% were over 60. In Cyprus it was not possible to integrated all age groups in the study. There were no people who were between 41 and 50 years old:

Below 20	13
21-30	25
31-40	31
41-50	0
51-60	19
Over 60	6

Figure 1 Age of the participants from Germany - Percentages.

Concerning the status 44% were teacher or trainers and 25% students or learners. This was the majority. The rest were staff members of the Human Resources Management (6%), business/company owners (6%), Educational and Career Counsellors (13%) or they haven´t provided an answer concerning this status aspect (6%).

Concerning the activity status most participants came from vocational schools (31%) or educational institutions (25%). Also 19% of the respondents did activities at a company.

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Moreover, 13 % were active at a university and 6% worked at VET providers as well as 6% at secondary schools.

Looking at the feedback of people who selected ´agree or ´strongly agree´ in the questionnaire it can be stated that in Cyprus 100% of the participants pointed out that they think that digitisation is the process of converting information into a digital (i.e. computer-readable) format and that also 100% of the participants see digitisation as a process of converting economic processes from an analogue to a digital way of work. Also 100% of the participants think that digitisation is the digital modification of instruments and tools. Also 93.75% of the participants agreed or strongly agreed to the idea that digitisation means to compress data lossless or lossy. In addition to that, 81.25% stated that digitisation is the process of digital change in society and the digital transformation which is recognized as the digital revolution. Last but not least also three quarters of the participants from Cyprus (75%) think that digitisation means optimisation of Business processes using information technology.

With regard to the study answers from Cyprus it seems that the people accept different and broad views on mean digitisation at the same time. Many participants agreed to nearly all definitions. This can be a hint that the concept is still not clear enough. The term digitisation seems to be used with many connotations which make transparency often not that easy. It can also provide the hint that in Cyprus digitisation and digitalisation seems not to be differentiated exactly.

In Cyprus 69% of the participants state that they are familiar with the term industry 4.0.

Taking the answers of the Cypriote participants into account digitisation focusses essentially on enhancing processes (96.88% rated for agree or strongly agree). Moreover, a huge number also agreed on the other aspects. Here, digitisation focusses essentially on digital network infrastructure (93.75%), on collecting data (93.75%) and offering information (93.75%). The lowest agreement percentage had the idea that digitisation focusses essentially on data security and privacy (81.25%). But, also with regard to this aspect the numbers are quite high.

In Cyprus, all respondents (rating for agree or strongly agree) were sure that digitisation should be handled by learner (100%) and business leaders (100%). The idea that digitisation should be handled by politicians got the lowest percentage (68.75%).

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Rating the importance of digitisation in Cyprus today on a scale from 1 to 10 where 1 stands for unimportant and 10 for important, the mean is 8.69. This is a quite high number which underpins the importance. With regard to the situation in 5 years the mean increases to 9.31. This provides the insight that the importance of digitization will increase in the future.

The same rating was done with regard to industry 4.0. Here, a similar effect can be found. Concerning the situation today the mean of the importance of the change in Cyprus concerning industry 4.0 is 7.94 while for the situation in 5 years it becomes 8.43. In total, these ratings show, that the Cypriote participants estimate that the importance of the change by industry 4.0 will increase in the future.

Asking the Cypriote participants concerning the competences which are important for the digital change in society a competence estimation profile became obvious:

	Very important	Important	Less important	Unimportant
Social competences	50.00	37.50	6.25	6.25
Communicative competences	50.00	37.50	6.25	6.25
Methodological competences	60.00	26.67	6.67	6.67
Process-related competences	66.67	26.67	0	6.67
Research-related competences	66.67	26.67	0	6.67
Subject specific competences	56.25	37.50	0	6.25
Practice-related competences	62.50	25.00	0	12.50
Managerial competences	50.00	37.50	0	12.50
Other, please specify:	0	0	0	0

Figure 2 Important competences for digital change - Cypriote respondents - Percentages.

It comes into view highest percentages for very important and import of the Cypriote participants points on subject-related competences (93,75%). But, also interesting are the high scores of process-related competences (93,34%) and research-related competences (93,34%). These are not that much in focus in the other countries as you will recognise later in this text.

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With regard to the skills which are important for the digital change in society the respondents of Cyprus the following overview can be provided:

	Very important	Important	Less important	Unimportant
Basic IT skills	81.25	8.33	4.17	6,25
Deep IT skills	87.50	7.29	0.00	5,21
Technical skills	68.75	18.75	5.21	7,29
Organisational skills	75.00	12.50	9.38	3,13
Applying theoretical knowledge	68.75	18.75	6.25	6,25
Self-awareness and self-management	62.50	18.75	6.25	12,50
Leadership skills	66.67	20.00	6.67	6,67
Team working skills	81.25	6.25	0.00	12,50
Planning skills	62.50	18.75	12.50	6,25
Implementation skills	62.50	25.00	6.25	6,25
Evaluation skills	62.50	25.00	0.00	12,50
Ethical skills	56.25	31.25	2.08	10,42
Problem-Solving skills	75.00	18.75	4.17	2,08
Decision Making skills	62.50	25.00	5.21	7,29
Data analysis skills	62.50	18.75	6.25	12,50
Flexibility	68.75	18.75	0.00	12,50
Patience	75.00	10.42	2.08	12,50
Other, please specify	0.00	0.00	0.00	0,00

Figure 3 Important competences for digital change - Cypriote respondents – percentage

With regard to the table above the highest percentage for a very important skill can be found at deep IT skills and here we also find the highest combination of important and very important (94.97%). Problem-solving skills are the second highest skill with regard to the importance estimation (93.75%). The lowest scores for importance can be found at data analysis skills (81.25%) and Planning skills (81.25%) which is also be surprising compared to the results in the other countries provided later in this text.

The rating of ´Digitisation is …´ provides us with a profile concerning digitisation and who it can be characterised. The following figure provides a red line for the rating of the situation

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today and a black line which represents the rating in the future (in five years). All numbers and crosses added in the profile show the mean of the rating in the specific row of the profile.

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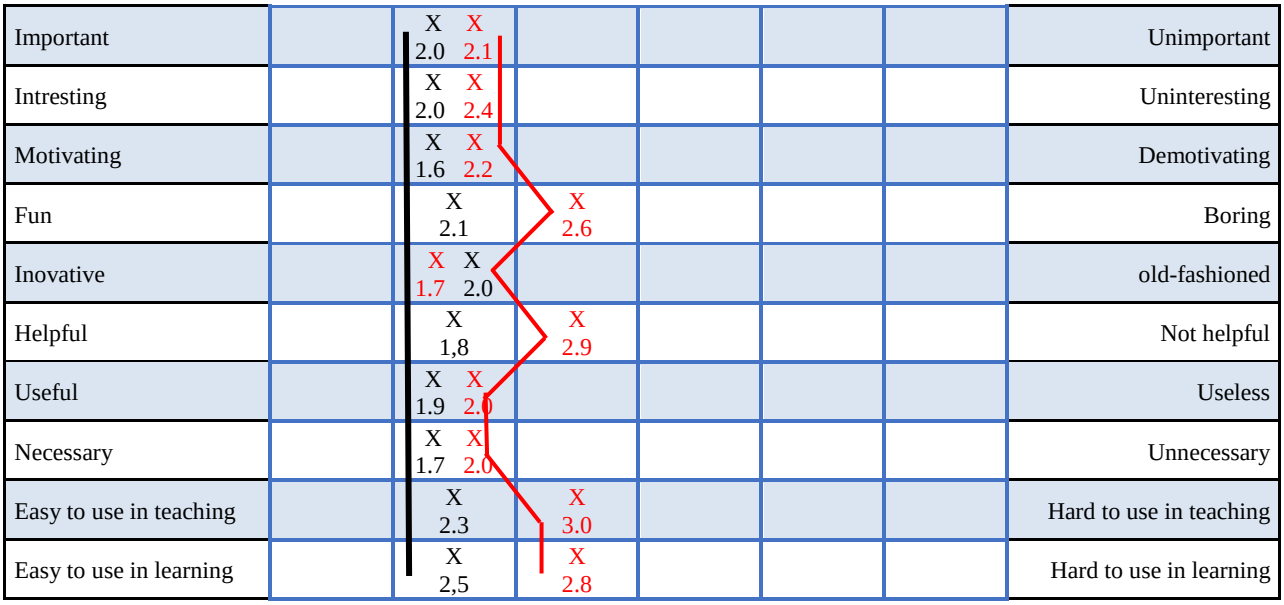

Figure 4 Profile of Digitisation for Cyprus – Means.

In addition to this positive trend of estimations for the situation in the future in Germany also 100% (79.1% yes and 20.9% rather yes) of the participants think that VET teachers and VET trainers should support their students with digitisation to foster their learning processes.

In Cyprus the participants also provided qualitative feedback on opportunities of digitisation and industry 4.0 will be displayed here in its categories (combined due to only a few answers):

1. potential is unlimited.
2. mass production could grow even faster and easier
3. the entire industrial sector will run only on quick digital data processes

With regard to the qualitative question of other challenges of digitisation and industry 4.0, the Cypriote participants mentioned the following categories:

1. financial issues
2. educating people who do not have a technological background to handle the new sophisticated machinery
3. . unemployed might rise as machines could replace the human factor

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II.II Insights into the results from Germany

Regarding the German study results it can be said that 115 participants took part in it. 43.5 of the respondents were female and 56.5% of the participants were male. 57.4% of the participants were under 40 years old (19.1% under 30 years) and 2.6% were over 60 years old. In Germany the study integrated all age groups.

Below 20	1.7
21-30	17.4
31-40	38.3
41-50	27.8
51-60	12.2
Over 60	2.6

Figure 5 Age of the participants from Germany - Percentages.

Concerning the status, it can be stated that 58.3% of the people who answered to the questionnaire in Germany were teachers and 15.7% were learners. The third largest group were business or company owners with 7% of all German respondents.

Also, with regard to their status, 66.1% of the German participants were active at a vocational school. 13% were active in a company and 7.8% at a university. Some people worked at chambers (5.2%), were active at a VET provider (2.6%), worked at an employer's association (1.7%) or at a trade union/ employees association (1.7%). Also 0.9% were active at a teacher association or at the government (0.9%).

In Germany 100% of the participants stated that they think that digitisation is the process of converting information into a digital (i.e. computer-readable) format. We are looking here concerning these aspects on people who selected ´agree or ´strongly agree´ in their feedback. And also, a huge number, namely 99.1% of the respondents think that digitisation is a process of converting economic processes from an analogue to a digital way of work. Moreover, 98.3% pointed out that digitisation is the digital modification of instruments and tools. Also 98.3% of the participants claimed that digitisation means optimisation of Business processes using information technology. 97.4% of the participants responded that digitisation is the process of digital change in society and the digital transformation which is recognized as the digital revolution. But only 39.1% of the German respondents think that digitisation means to compress data lossless or lossy.

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For Germany these results mean that the people are not really able to see the differences in different views on digitisation. But, most of them are very sure that compressing data without loss is not a core focus on digitisation. The numbers of participants who agreed to nearly all definitions were enormous and this may hint to the need of more awareness concerning the tasks and elements of digitisation or it may hint on the fact that the term digitisation is used with many different connotations in Germany. This also indicates that a difference between digitisation and digitalisation seems not really to be focused in Germany today.

The term industry 4.0 is known by 67% of the German participants which is nearly 2 thirds of the respondents.

Concerning the challenges which come along with digitisation most of the respondents agreed or strongly agreed to challenges for society (68.7% + 30.4% = 99.1%). Also 99.1% agreed or strongly agreed on challenges for politics, on challenges for enterprises / companies and on challenges for teachers/trainers. But the strength of agreement between these four is different in order of their mentioning in the sentences before. The next table will provide a more detailed overview and also shows that also other possible challenges are rated quite high:

	Strongly agree	Agree	Disagree	Strongly disagree
Digitisation is a process which challenges society.	68.7	30.4	0.9	0
Digitisation is a process which challenges enterprises / companies.	47	52.2	0.9	0
Digitisation is a process which challenges everyone.	41.7	56.5	1.7	0
Digitisation is a process which challenges teachers / trainers.	41	50	0.9	0
Digitisation is a process which challenges learners.	39.1	57.4	3.5	0
Digitisation is a process which challenges politics.	44.3	54.8	0..9	0
Digitisation is a process which challenges economy.	38.3	60.0	0.9	0

Figure 6 Challenges of Digitisation with regard to German respondents - Percentages.

This shows that the participants seem to be very aware of possible risks and challenges. The agreement is very high in all presented cases. This could also hint on uncertainty which goes sometimes along with overestimation of challenges. But, it has to be noted that the participants feel this way even if their estimation may not be realistic. This may hint to the need of more information and transparency.

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According to the German participants digitisation focusses essentially on data security and privacy (98.3%) as well as on enhancing processes (98.3%). Here, we look at the answers of the participants who agreed or strongly agreed. 93.0 % of the respondents think that digitisation focusses essentially on offering information. Moreover, 92.2% pointed out that digitisation focusses essentially on digital network infrastructure. Just, the idea that digitisation focusses essentially on data collection was not agreed on that much (65.2%) but also here nearly two third of the respondents agreed.

In Germany, all respondents (agree or strongly agree) think that digitisation should be handled by VET providers (100%), technical experts (100%), staff members if companies (100%) and teachers and trainers (100%). The lowest percentage of 87.8% stated that digitisation should be handled by politicians.

Rating the importance of digitisation today on a scale from 1 to 10 where 1 stands for unimportant and 10 for important, the mean is 7.46, which is pretty high. With regard to the situation in 5 years the mean goes up to 8.00 which shows that the importance will increase.

Doing the same rating with regard to industry 4.0 a similar effect can be seen on a level which is just a bit higher. For today the mean of the importance of the change concerning industry 4.0 is 7.60 while for the situation in 5 years it is 8.82. These ratings show, that the German participants think that the importance of the change by industry 4.0 will increase as well.

Regarding the competences which are important for the digital change in society the following results occurred:

	Very important	Important	Less important	Unimportant
Social competences	7,00	85.2	7.8	0
Communicative competences	45.2	54.8	0	0
Methodological competences	34.8	65.2	0	0
Process-related competences	73.9	26.1	0	0
Research-related competences	0.9	43.5	53.00	2.6
Subject specific competences	57.4	40.0	2.6	0
Practice-related competences	12.2	83.5	4.3	0
Managerial competences	8.7	81.7	9.6	0
Other, please specify:	0	0	0	0

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Figure 7 Important competences for digital change - German respondents - Percentages.

Interesting is the fact that the majority of the German participants points out that research-related competences are less or unimportant. All other provided competences were seen as relevant (rating at important or very important). Also remarkable is the fact that always 100% of the respondents agree or strongly agree on the importance of communicative competences, methodological competences and process-related competences.

With regard to the skills which are important for the digital change in society the German participants of the study put the number of persons who voted for very important on ethical skills .

	Very important	Important	Less important	Unimportant
Basic IT skills	76.5	23.5	0	0
Deep IT skills	86.1	13.9	0	0
Technical skills	18.3	81.7	0	0
Organisational skills	52.2	47.8	0	0
Applying theoretical knowledge	7.0	57.4	35.7	0
Self-awareness and self-management	0	19.1	80.9	0
Leadership skills	0	21.7	76.5	1.7
Team working skills	0	56.5	43.5	0
Planning skills	77.4	22.6	0	0
Implementation skills	31.3	67.8	0.9	0
Evaluation skills	2.6	90.4	7.0	0
Ethical skills	2.6	67.8	29.6	0
Problem-Solving skills	79.1	20.9	0	0
Decision Making skills	47.0	52.2	0.98	0
Data analysis skills	10.4	85.2	4.3	0
Flexibility	14.8	82.6	2.6	0
Patience	10.4	85.2	2.6	1.7
Other, please specify	0	0	0	100.00

Figure 8 Important competences for digital change - German respondents – percentages

The highest percentage for a very important skill can be found at Deep IT skills. 100 % of the respondents think that Basic IT skills, Deep IT skills, technical skills organisational skills and problem-solving skills are important or very important. The skills Self-awareness and self-

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management (80.9%) as well as Leadership skills (78.2%) are seen by the majority of the German participants as unimportant or less important.

Having a closer look at digitisation (Digitisation is …) a profile can be created. In the following figure the red line describes the rating for the situation today and the black line represents the rating for the situation in the future with regard to a five years perspective. The crosses with the numbers next to it provide always the mean of the rating in this profile row.

Important	X 1,5	X 1,80					Unimportant
Intresting	X 1,5	X 1,8					Uninteresting
Motivating		X 1,6	X 1,9				Demotivating
Fun		X 1,6	X 1,8				Boring
Inovative	X 1,5	X 1,8					old-fashioned
Helpful	X 1,5	X 1,6	X 2,0				Not helpful
Useful	X 1,5	X 2,0					Useless
Necessary		X 1,8	X 1,9				Unnecessary
Easy to use in teaching	X 1,5	X 2,0					Hard to use in teaching
Easy to use in learning	X 1,2	X 2,0					Hard to use in learning

Figure 9 Profile of Digitisation for Germany – Means.

In addition to this positive trend of estimations for the situation in the future in Germany also 100% (79.1% yes and 20.9% rather yes) of the participants think that VET teachers and VET trainers should support their students with digitisation to foster their learning processes.

In Germany the participants also provided qualitative feedback on opportunities of digitisation which will be displayed here in its categories:

1. Speeding up knowledge (mentioned with the highest frequency of 7 times
2. Knowledge is increasing
3. Processes are quicker
4. Cost reduction
5. More automation
6. Everybody can get information easily

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7. Better life standard
8. More content
9. Less problems

The qualitative feedback on opportunities of industry 4.0 of the German participants focused on the following categories:

1. Processes are much smoother (mentioned with the highest frequency of 4 times)
2. Easier work
3. Speeding up production
4. More interaction
5. Better overview
6. Clear information on work structures
7. Smart products
8. Services can be increased
9. new markets
10. better in competition
11. workforce is better involved
12. new possibilities

Concerning the qualitative question of other challenges of digitisation, the German participants mentioned the next categories:

1. too much work (mentioned with the highest frequency of 11 times)
2. data security
3. information losses
4. no concept
5. different approaches
6. cost intensive
7. content not only created by experts
8. financing is complicated

Regarding the qualitative categories on challenges of industry 4.0 the respondents answered:

1. data security (mentioned with the highest frequency of 12 times)

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2. workload
3. no process overview
4. high costs
5. only experts are aware of industry 4.0
6. different in every enterprise
7. need to teach industry 4.0 and digitisation

Interesting is here that there a cost effects mentioned as opportunities (low costs) and challenges (high costs) and also a similar situation regarding getting overview (opportunity: better overview; challenge: no process overview). The participant seems to have different ideas or estimations concerning these topics.

II.III Insights into the results from Romania

In Romania N= 111 participants responded to the study. With regard to Romania 60% of the respondents were female and 38% were male. 2 % would rather not say anything about gender. The majority of the respondents was up to 30 years old (52%) but the study integrated here participants of all age groups. But just 3% were over 60 years old.

Below 20	29
21-30	23
31-40	19
41-50	15
51-60	11
Over 60	3

Figure 10 Age of the participants from Romania - Percentages.

20 % of the people who answered to the questionnaire in Romania were teachers and 38% were learners. The third largest group were business or company owners with 10% of all Romanian respondents. With regard to their status 19% were active at a primary school and 11% were active in a secondary school. The other teachers 3% of the respondents came from vocational schools. 10 % of the participants in Romania were active at a university and also 10% at another educational institution. 18% of the people were active at a company. Some people worked at chambers (3%), at an employer's association (8%) or at a trade union/ employees association (1%) while the rest provided no answer.

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In Romania 92% of the people who took part in the study think that digitisation means optimisation of Business processes using information technology (they selected agree or strongly agree). 90% of the respondents agreed or strongly agreed to the definition that digitisation is the process of converting information into a digital (i.e. computer-readable) format. Bit less percentages of the respondents, namely 86%, agreed or strongly agreed to the definition that digitisation is a process of converting economic processes from an analogue to a digital way of work. 80% stated that digitisation is the process of digital change in society and the digital transformation which is recognized as the digital revolution. Moreover, 76% pointed out that digitisation is the digital modification of instruments and tools. Also 70% of the Romanian respondents think that digitisation means to compress data lossless or lossy. This is in total quite surprising because all definitions provide a different focus. Always more than 3 quarters of the participants agreed or strongly agreed and seems to hint on the fact that they are not really sure, what is exactly focussed with digitisation or have a good overview what different aspects could be addressed with the same term. A difference between digitisation and digitalisation seems not really be focused. The term industry 4.0 is known by 53% of the Romanian participants which is just a bit more than half of the respondents. Regarding challenges which go along with digitisation most of the respondents agreed or strongly agreed to challenges for society (49% + 43% = 92%). But also, other challenges could be seen:

	Strongly agree	Agree	Disagree	Strongly disagree
Digitisation is a process which challenges society.	43	38	15	4
Digitisation is a process which challenges enterprises / companies.	43	49	7	1
Digitisation is a process which challenges everyone.	41	35	22	2
Digitisation is a process which challenges teachers/trainers.	41	50	9	0
Digitisation is a process which challenges learners.	40	49	11	0
Digitisation is a process which challenges politics.	22	51	26	1
Digitisation is a process which challenges economy.	39	51	9	1

Figure 11 Challenges of Digitisation with regard to Romanian respondents - Percentages.

Digitisation focusses essentially on digital network infrastructure is a statement that 86% of the participants agreed or strongly agreed on. Also 84% of the respondents think that digitisation focusses essentially on offering information. 82% see in digitisation a process of data collection.

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78 % pointed out that digitisation focusses essentially on enhancing processes while 71% state that digitisation focusses essentially on data security and privacy.

Most respondents think that digitisation should be handled by VET providers, 98 participants, followed by 93 respondents who think it should be handled by technical experts and 92% who think it should be handled by teachers and trainers. The lowest percentage of only 55% stated that digitisation should be handled by politicians.

Rating the importance of digitisation today on a scale from 1 to 10 where 1 stands for unimportant and 10 for important, the mean is 8.15, which is pretty high. With regard to the situation in 5 years the mean goes up to 8.92 which shows that the importance will increase.

Doing the same rating with regard to industry 4.0 a similar effect can be seen on a level which is just a bit lower. For today the mean of the importance of the change concerning industry 4.0 is 8.11 while for the situation in 5 years it is 8.73. This also shows that the Romanian participants think that the importance of the change by industry 4.0 will increase as well.

With regard to the competences which are important for the digital change in society the following results occurred:

	Very important	Important	Less important	Unimportant
Social competences	33	46	16	5
Communicative competences	40	49	8	3
Methodological competences	35	50	12	3
Process-related competences	39	44	14	3
Research-related competences	49	42	7	2
Subject specific competences	53	41	4	2
Practice-related competences	41	48	8	3
Managerial competences	37	45	15	3
Other, please specify:	0	0	0	0

Figure 12 Important competences for digital change - Romanian respondents - Percentages.

Here the important competences are practice-related and research related competences and communicative competences. But, also the other competence aspects are rated quite high. The highest number of ´very important´ ratings can be found at subject specific competences. Here

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is also the highest percentage of the combined rating of important or very important, which is 90%.

With regard to the skills which are important for the digital change in society the participants put the number of persons who voted for very important on ethical skills.

	Very important	Important	Less important	Unimportant
Basic IT skills	55	29	8	7
Deep IT skills	55	36	10	
Technical skills	43	48	4	1
Organisational skills	35	50	12	2
Applying theoretical knowledge	40	47	9	
Self-awareness and self-management	30	49	13	5
Leadership skills	29	39	23	7
Team working skills	42	45	7	2
Planning skills	35	48	9	4
Implementation skills	36	50	8	1
Evaluation skills	29	58	9	2
Ethical skills	29	57	17	5
Problem-Solving skills	36	55	8	1
Decision Making skills	42	47	8	1
Data analysis skills	46	44	7	
Flexibility	36	42	16	4
Patience	32	41	10	7
Other, please specify				

Figure 13 Important competences for digital change - Romanian respondents – Number of particiants who voted.

The highest numbers of participants who voted with very important or important can be found at deep IT skills (91 participants), technical skills (91 participants), problem-solving skills (91 participants) and data analysis skills (90 participants).

The profile concerning digitisation (Digitisation is …) looks like this in red, when you fill in the means of each row and concerning digitisation with regard to the (Digitisation will be …) like this in black:

Important		X 1,6	X 2,0				Unimportant
Intresting		X 1,6	X 1,8				Uninteresting
Motivating		X 1,8	X 2,2				Demotivating

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Fun		X 1,9	X 2,5				Boring
Inovative		X 1,6	X 1,7				old-fashioned
Helpful		X 1,6	X 1,6				Not helpful
Useful	X 1,5	X 1,6					Useless
Necessary	X 1,5	X 1,7					Unnecessary
Easy to use in teaching		X 1,6	X 1,9				Hard to use in teaching
Easy to use in learning		X 1,6	X 1,8				Hard to use in learning

Figure 14 Profile of Digitisation for Romania – Means.

In total in Romania 93% of the participants think that VET teachers and VET trainers should support their students with digitisation to foster their learning processes.

II.IV Insights into the results from United Kingdom

In UK N= 103 participants responded to the study. With regard to UK 61.9% of the respondents were female and 38.1% were male. The majority of the respondents was up to 40 years old (61.2%) but the study integrated here participants of all age groups. But just 1% were over 60 years old.

Below 20	15.3
21-30	25.5
31-40	20.4
41-50	25.5
51-60	12.2
Over 60	1.0

Figure 15 Age of the participants from Romania - Percentages.

25.5% of the people who answered to the questionnaire in UK were teachers and 37.8% were learners/students. The third largest group of all UK respondents were other types of educational experts with 12.2%. With regard to their status no one was active at a primary school and 17.3% were active in a secondary school. The other teachers 19.4% of the respondents came from VET providers schools. 25.5% were active at universities, 28.6% came from other educational institutions. Some people 7.1% worked at companies and 2.0% at other institutions.

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In UK 100% of the respondents were sure that digitisation is the process of converting information into a digital (i.e. computer-readable) format. At bit less - 99% of the people who took part in the study think that digitisation means optimisation is a process of converting economic processes from an analogue to a digital way of work. They selected agree or strongly agree. 95.1 % of the respondents stated that digitisation is the process of digital change in society and the digital transformation. According to 90.3% of the participants digitisation means optimisation of business processes using information technology. This is in total quite surprising because all definitions provide a different focus. Always more than 3 quarters of the participants agreed or strongly agreed and seems to hint on the fact that they are not really sure, what is exactly focussed with digitisation or have a good overview what different aspects could be addressed with the same term. A difference between digitisation and digitalisation seems not really be focused. The term industry 4.0 is known by 80.6% of the UK participants and therefore has a broad basis in UK.

Regarding challenges which go along with digitisation most of the respondents agreed or strongly agreed to the statement ´Digitisation is a process which challenges teachers/trainers.´ (73.8% + 19.4% = 92%). But also, other challenges could be seen:

	Strongly agree	Agree	Disagree	Strongly disagree
Digitisation is a process which challenges society.	67.0	25.2	5.8	1.9
Digitisation is a process which challenges enterprises / companies.	73.8	19.4	3.9	2.9
Digitisation is a process which challenges everyone.	77.5	13.7	5.9	2.9
Digitisation is a process which challenges teachers/trainers.	73.8	19.4	5.8	1.0
Digitisation is a process which challenges learners.	56.3	32.0	9.7	1.9
Digitisation is a process which challenges politics.	65.0	25.2	7.8	1.9
Digitisation is a process which challenges economy.	78.6	11.7	7.8	1.9

Figure 16 Challenges of Digitisation with regard to UK respondents - Percentages.

According to 98.1% of the UK respondents who agreed or strongly agreed digitisation focusses essentially on enhancing processes. In addition to that, 97.1% of the British participants pointed out that digitisation is essentially on offering information. Moreover, 95.1% stated that digitisation is essentially about collecting data. 92.2% had in mind that digitisation focusses essentially on digital network infrastructure. But, only 73.8 % stated that digitisation focusses essentially on data security and privacy.

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Most respondents think that digitisation should be handled by technical experts (99.0%). This is followed by 97.1 % who think it should be handled by teacher, 92.2% of the respondents who think it should be handled by VET providers and 88.3% who think that digitisation should be handled by learners. The lowest percentage of only 52.4% stated that digitisation should be handled by politicians.

Rating the importance of digitisation today on a scale from 1 to 10 where 1 stands for unimportant and 10 for important, the mean is 8.5, which is really high. With regard to the situation in 5 years the mean goes up to 9.63 which shows that the importance will increase tremendously.

Doing the same rating with regard to industry 4.0 a similar effect can be seen on a level which is a bit lower. For today the mean of the importance of the change concerning industry 4.0 is 7.8 while for the situation in 5 years it is 9.32. This means that the UK participants point out that the importance of the change by industry 4.0 will increase, too.

Concerning the competences which are important for the digital change in society / industry 4.0 the following table offers the core results:

	Very important	Important	Less important	Unimportant
Social competences	91.2	0.0	7.8	1.0
Communicative competences	98.0	0.0	1.0	1.0
Methodological competences	87.1	0.0	11.9	1.0
Process-related competences	84.3	0.0	14.7	1.0
Research-related competences	93.1	0.0	5.9	1.0
Subject specific competences	95.1	0.0	3.9	1.0
Practice-related competences	94.1	0.0	4.9	1.0
Managerial competences	94.1	0.0	4.9	1.0
Other, please specify:	69.6	0.0	8.7	21.7

Figure 17 Important competences for digital change - UK respondents - Percentages.

Within this overview the most important competences are communicative competences, subject specific competences, practice-related and managerial competences. But, also most of the other

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competence aspects are rated quite high (above 85%). The highest number of ´very important´ ratings can be found at communicative competences.

With regard to the skills which are important for the digital change in society the participants put the number of persons who voted for very important on ethical skills.

	Very important	Important	Less important	Unimportant
Basic IT skills	97.1	0.0	2.0	1.0
Deep IT skills	53.9	0.0	46.1	0.0
Technical skills	80.4	0.0	19.6	0.0
Organisational skills	97.1	0.0	2.9	0.0
Applying theoretical knowledge	86.3	0.0	13.7	0.0
Self-awareness and self-management	95.1	0.0	4.9	0.0
Leadership skills	93.1	0.0	5.9	1.0
Team working skills	98.0	0.0	1.0	1.0
Planning skills	100.0	0.0	0.0	0.0
Implementation skills	97.0	0.0	3.0	0.0
Evaluation skills	94.1	0.0	5.9	0.0
Ethical skills	98.0	0.0	2.0	0.0
Problem-Solving skills	99.0	0.0	1.0	0.0
Decision Making skills	97.1	0.0	2.9	0.0
Data analysis skills	95.1	0.0	4.9	0.0
Flexibility	80.0	0.0	0.0	20.0
Patience	0.0	0.0	0.0	0.0
Other, please specify	0.0	0.0	0.0	0.0

Figure 18 Important competences for digital change - UK respondents – Number of particiants who voted.

The highest numbers of participants who voted with very important or important can be found at planning skills (100%), problem-solving skills (99 %), team working skills (98%) and ethical skills (98%).

Filling in the means of each row the profile concerning digitisation today (Digitisation is …) looks like the red line and concerning digitisation with regard to the future (Digitisation will be …) looks like black line:

Important			X 3,5	X 3.9			Unimportant
Intresting				X 3,6	X 4,0		Uninteresting
Motivating			X 3,5	X 3.9			Demotivating

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Fun				X X 3,6 3,8			Boring
Inovative				X X 3,6 3,9			old-fashioned
Helpful				X X 3,8 3,9			Not helpful
Useful			X 3,3	X 3.8			Useless
Necessary			X 3,3	X 3.8			Unnecessary
Easy to use in teaching	X 1,3.			X 3,9			Hard to use in teaching
Easy to use in learning				X 4.0			Hard to use in learning

Figure 19 Profile of Digitisation for UK – Means.

In UK no participants answered on the question if VET teachers and VET trainers should support their students with digitisation to foster their learning processes.

Nevertheless, UK the participants also provided qualitative feedback on opportunities of digitisation which will be displayed here in its core categories:

1. Benefits to humanity globally due to easing of work processes and better work-life balances. / Better work-life balance (6 times)
2. Better compiled/longer lasting data (2 times)
3. Cheaper production (2 times)
4. Decreased inequality effecting all industries (2 times)
5. Digitisation is easing work processes benefitting humanity across the world.
6. New Innovations
7. The rise of digitisation will create new job opportunities
8. People can lean faster
9. Easier access to education

The qualitative feedback on opportunities of industry 4.0 of the UK participants focused mainly on the following categories:

1. All sectors benefit from new technology from telecommunications, information, media, entertainment to medical, food and even leisure industries (12 times)
2. New products and services (5 times)

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3. Increase efficiency, profit margins, increased productivity and economic growth (5 times)
4. Easing working practices and allowing more free time for personal hobbies and leisure. (4 times)
5. Processes are much smoother (mentioned with the highest frequency of 4 times)
6. Speeding up production (2 times)

Concerning the qualitative question of other challenges of digitisation, the UK participants mentioned the next categories:

1. Privacy and security (19 times)
2. Lack of labour force who is fully adapted to work in an environment influenced by digitisation
3. Lack of social skills

Regarding the qualitative categories on other topics which should be addressed:

1. A new code and security precautions may be needed for the safety of all users across the internet (3 times)
2. Promote privacy (2 times)
3. Issues about misinformation, fake news is a major challenge facing educators in the 21st Century (2 times)
4. Ethical and moral issues

Interesting is here that privacy issues are mentioned several times with different decisions and that this emphasises the importance of these aspects.

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References

All information are own study results of the DigI-VET project.