Comparative Study on the 21st Century Relevance of Textbooks and Learning Content

Multidisciplinary, Project-based Digital Learning Content for VET

VETPROFIT

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Content

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Introduction

The aim of the first working phase (PR1) was to perform a thorough analysis of learning outcomes, curricula, learning materials and applied methods of the initial/basic training of two sectors: Agriculture and Forestry, IT and Telecommunications in all partner countries. The present Comparative Study analyzing the survey results in each country helps identify the educational needs of the chosen sectors in the partner countries on which the next project phase will be based on.

In order to implement a thorough survey, we targeted all the key actors of the target groups: VET teachers at different EQF levels, VET students at different ages and EQF levels and companies/enterprises operating in the relevant industrial fields with different size and operational area were involved in it in every partner country. The survey was focused on identifying the needs of teachers and students regarding textbooks and digital learning materials and asking companies (from the selected two sectors) about their requirements against young professionals applying for their vacancies.

We applied different methods for multiple approach:

- *a desktop survey based on the preliminary needs-analysis to learn about the available official textbooks, standard curricula and learning materials related to the initial training (IVET) in all partner countries, in order to get a deeper insight into the similarities and differences among the systems and a detailed overview of the VET System in each country.*
- *Interviews with stakeholders involved in VET education (teachers, students and company representatives)*
- *an online questionnaire for teachers to get a clear picture of their digital skills level in accordance with DigCompEdu and their preferred teaching and assessment methods and practices with regard to the application of innovative methods.*

The partners carried out interview-based surveys with relevant stakeholders (teachers, students and companies) of the wo sectors: IT and Telecommunication and Agriculture and Forestry and distributed the online questionnaire to external VET teachers. The partnership had defined topics for the interviews and a pattern to follow performing them and created questions to be asked from external teachers online.

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Having the results analyzed in the partner countries, country reports were compiled by each based on which the present Comparative study was prepared to reveal the current state and needs of the stakeholders of VET in the targeted sectors in Italy, Germany and Hungary.

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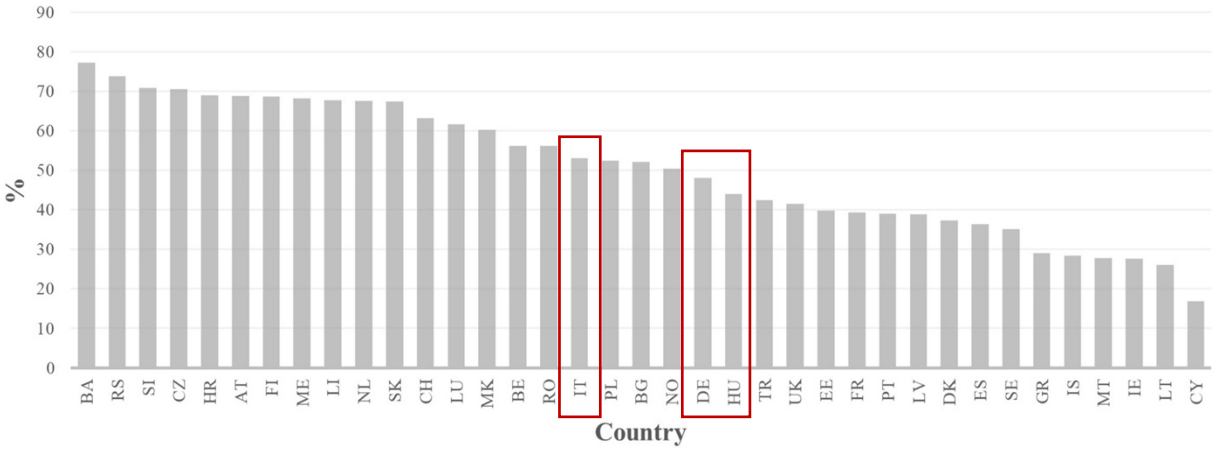
VET systems – differences, similarities

While the structure of the VET system is very different, the main trends are close to each other in the three countries. The Italian chart presents simpler VET than the Hungarian and German systems, however the EQF framework allows the VET systems of the three countries to be identified and compared.

The vocational education starts at the age of 14-15 years in all three countries.

The rate of the students in secondary and upper secondary vocational education is close to 50% in all three countries (2019), this figure is slightly higher in Italy, and is lower than 50% in Hungary, these are close to the EU average of 47,8% (2017).



Students in upper secondary VET in% (2019) Note. Data source: Eurostat (2021).
https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=educ_uoe_enrs04

In Hungary the number of enrolled students into vocational schools decreased during the recent years, the young prefer the general grammar secondary schools.

A key aim of the new vocational education and training system to be introduced from 2020/2021 was to change this trend in Hungary. In addition to scholarships, it offers a more attractive future and supports graduates in further study (after vocational study at EQF Level 3-4 they can continue their studies and maturate, while after EQF Level 5 VET (technikum) they can continue in higher education BA/BSc or MA/MSc with credit transfer).

EQF levels

All three countries have lower and higher vocational education and training (EQF levels 3, 4 and 5 respectively), and there are also remedial courses in German and Hungarian vocational education and training.

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A special feature of Italian VET is, that there are the so-called **Vocational Upper Technical Institutes**, offering **short-cycle non-university post-secondary higher education**. The courses last 4 semesters (in very few cases 6) for a total of 1800/2000 hours of training and they lead to the qualification of "Higher/Advanced technician". Similar option exits in Hungary as well, such training can be offered by formal VET schools and private companies as well, and the HE institutes offer vocational qualification at EQF Level 5, but these are not part of the vocational education and training system, but the lowest level of higher education, so called tertiary vocational education (4 semesters). Also in Germany, various special programmes are available at post-secondary level, regulated by federal state legislation.

The charts shows that the higher educational institutes do not offer vocational educational programs, while in Hungary they deliver VET programs at EQF level 5, and in Germany at EQF level 6 (Bachelor professionals and at EQF level 7 (Master professionals) as well.

Governance of Vocational Education

There are crucial differences among the governance of VET as well.

In Italy the Ministry of Education and the Ministry of Labour lay down general principles and rules for the VET system, but then the Regions have exclusive legislative power over the VET programmes. Italy is a big country, so the demands of the labour market might significantly differ among the region, that could explain the freedom in deciding on the VET programs.

In Germany the VET programmes are based on nationally recognised occupations and vocational training regulations, which guarantee a national standard. However, at regional level, the Federal State ministries of education and cultural affairs oversee general and vocational education at schools, the higher education sector, adult education. This results in differences among the Federal States in aspects such as programme names, duration, and curricula of certain programmes. To ensure a certain degree of uniformity, the State ministers participate in the standing committee (Standing Conference of the Ministers of Education and Cultural Affairs), where recommendations are brought forward; these need to pass individual State parliaments before becoming legally binding.

In Hungary, vocational education and training is managed by two bodies: the Ministry of the Interior is responsible for public education, while the Ministry of Culture and Innovation is responsible for vocational education and training and adult education. There are standard curricula offered by the state for both school-based education and adult education (training and outcome requirements, training program requirement, training curriculum), but VET schools and adult education providers can adapt these to their specific needs, while the learning outcomes measured and assessed by final

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examinations are the same for all VET institutions. While schools have some freedom in curricula, administrative management is highly centralized.

Apprenticeship, dual system

Apprenticeship is available at all levels and programmes in each country and work-based learning is focused more-and-more. The dual system has been a strong and traditional component of German vocational education and training for decades, has a long history and has been the focus of policy makers in Italy (2015). The dual system has also been present in Hungarian vocational education and training for a longer period, but its wider expansion has only accelerated in recent years (2020).

Work-based learning is a traditional feature of the German education system, and it plays an important role in most secondary and tertiary vocational education and training programs. The VET system includes both initial and continuing training and is considered a successful model, largely based on a dual system (practical training based on apprenticeship contract) leading to a high-quality vocational qualification.

In Italy the promotion of the dual system in three-year EQF 3 programmes (IeFP) aims to relaunch apprenticeship with the allocation of new resources from the Government for the realisation of paths characterised by a high amount of in-company training (minimum of 400 hours per year) or virtual business simulation, and new individualised training plans.

Further interesting feature of the Italian system is the "*school-work alternance has been replaced by transversal competence and guidance pathways*" in 2019. This will support the acquisition of interdisciplinary skills and raise learners' vocational awareness.

This method should be discussed by the project partners as such efforts are close to the **VETProfit** concept.

VET in adult education (CVET)

In all the three countries there are VET programs for adult learners, and the providers can be in VET schools and with special restrictions private companies as well.

If we want to underline the strengths of the VET systems, we can conclude that in Italy and in Germany that is the dual system and the very close collaboration with the representatives of the labor market. As regards Hungary, the innovative aspects of the new reform can be mentioned as the most important strengths with strong efforts on the dual system. The other promising feature of the new Hungarian VET system is that VET 4.0 strategy is connected strongly to the twin – green and digital – transition of the economy. The action plans based on the strategy put special focus on implementing the ICT infrastructure the development of digital learning contents and improving the digital competences of teachers.

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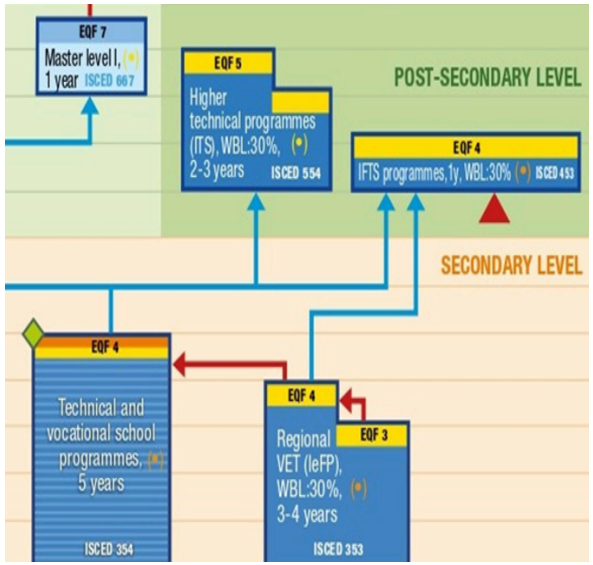	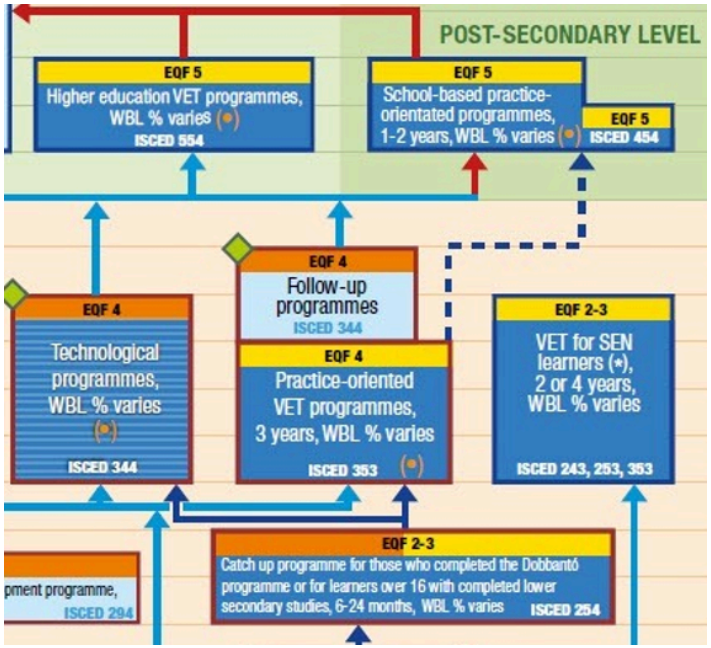	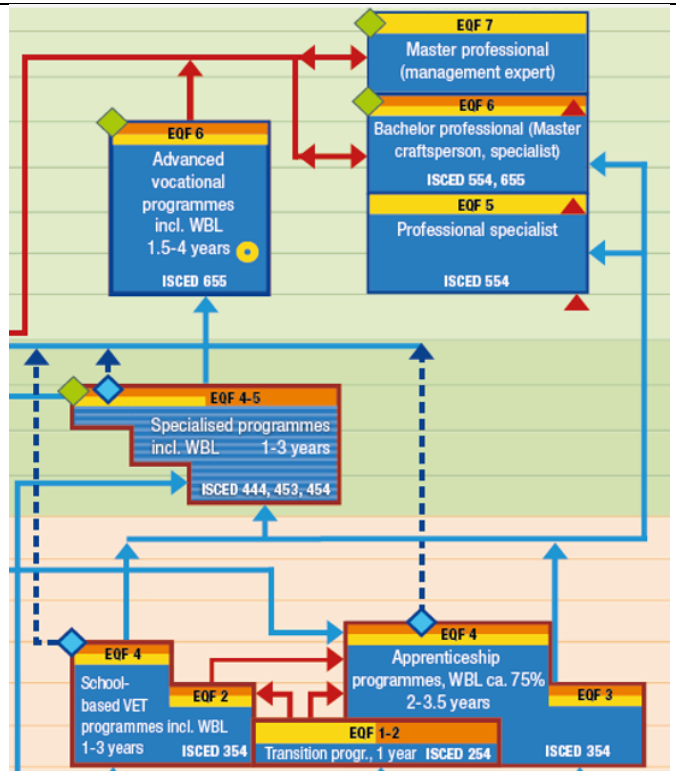
Italy	Hungary	Germany

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Interview based research

The partners carried out interview-based surveys with relevant stakeholders (teachers, students, and companies) of the selected two sectors to identify their special needs regarding the learning content, teaching methods and the skills are the most important for companies.

In this section we present only the main conclusions, but the detailed reports can be read as well in Annex 1, and the questionnaires developed and applied by the partnership is also available in Annex 2.

	GERMANY	HUNGARY	ITALY	**TOTAL**
TEACHERS	6	10	5	**21**
STUDENTS	5	15	5	**25**
COMPANIES	2	10	2	**14**
	13	**35**	**12**	

Distribution of the samples by countries and by target groups

Summary of the interviews

Even if all EU and worldwide studies show the same conclusions, the result of the company-interviews was surprising: almost 100% of the interviewed companies stated the needs for soft skills, namely management skills, communication skills, reliability, interest in personal development, critical faculties, perseverance, practical skills, proactivity, critical thinking and questioning, autonomy when performing their tasks.

Most of the teachers are aware of these demands, however, many of them claim to be not experienced in active teaching methods (like project-based learning) important to develop transversal skills of students. Only 24% of the respondents making projects in a collaboration of other teachers and only 22% of them applies innovative assessment techniques like evaluation by portfolio. Slight differences could be identified among the countries, the figures show a better situation in Italy and in Slovenia because the quality of the school they work for is higher than the average in these countries.

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The shortage of up-to-date textbooks and the need for digital learning contents was claimed in each country ("no good professional textbooks, often you have to collect the material from several places, which is a lot of work"), 47% of the teachers claimed that the standard curricula do not contain enough information about new trends and technologies. General practice is (and need for!) creating their own learning contents year-to-year mostly in the form of PPTs, while the students expressed the advantages of video-based lessons for their learning.

Teachers' digital literacy varies greatly, with some using the resources only to offer content to students, while the majority of teachers use them to prepare the teaching material and the exercises for practice. After almost 30 years of learning and teaching with technology, the 80% of the teachers evaluated his/her digital competences to the middle.

The term of OER (Open educational Resources) isn't known, and a real surprise was that several respondent teachers didn't know, what „EQF level" means.

Concerning their readiness for renewing teaching methods the main conclusions of the interviews and online surveys with teacher were as follows:

- The teachers rank their digital skills at middle level. All of them said, that they need support for using digital tools in the classroom. Some differences could be identified between the countries, the Slovenian teachers consider their digital skill higher than the average, while the German teachers claimed on the pure IT background and lack of high-speed internet connection.

- The teachers are trying continuously improving their teaching methods, they are aware of the importance of focusing on soft skills, however, many of them indicates further trainings in active teaching methods, and especially in innovative assessment methods which support them to develop transversal skills more effectively.

Finally, the students interviewed said that they need more practice-oriented lessons, fewer theory, and more digital learning contents. They explained, that during the pandemic several teachers recorded the explanation, and it was very useful as they could watch the videos as many times as they needed.

VET students in the focused sectors claim for better structured course materials and new, more complex assessment methods rather than simple grading if they have heard about new innovative methods at all. Overall, they prefer using digital training materials to paper-based textbooks. Where there is not such a practice, students would like to learn by doing, implementing real-life projects.

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When claiming for more practical tasks and projects they specified that these projects must be real-life projects not hypothetical. They showed strong belief in their teachers' skills and preparedness in creating own specific learning content.

Where this is not the case, students want to learn through real-life projects. The survey found that they would like more hands-on tasks and projects and specified that these projects should be real projects rather than hypothetical ones. They have confidence in the skills and preparation of their teachers, and say they need additional learning materials created by teachers.

Companies involved in the survey seem satisfied with the obtained theoretical knowledge and practical skills of the fresh graduates or trainees they are contacted with. The representatives of both agricultural and IT sectors mentioned *the lack of project management skills and soft skills* that are highly needed in real work, such as *design thinking, critical thinking, communication skills* in the first row.

Companies suggest that there should be more autonomy for teachers, more up-to-date theoretical training, closer cooperation with companies and that the student's participation in internships and dual training could improve the quality of education. For further motivation of students, they suggested even financial rewards for participation in real projects and practical programs before training to familiarize students with their chosen profession.

Based on the results of the in-depth survey, there is a clear need for a new model of collaborative learning content development for all participants in the learning process (teachers and students) and end-users (companies) in the selected sectors. Regardless of the differences between the partner countries' VET systems, with a focus on developing students' transversal competences. Most companies/enterprises involved into the survey are open for collaboration with VET schools in order the close the gap between school education and real professional requirements and the only obstacle for them is their capacity of time which is very few in the case of micro-companies or family enterprises.

Online survey with VET teachers

Teachers working in VET but being external to the project were also asked by filling in a thorough an online questionnaire. The questionnaire was available in English, Hungarian, Italian and German and all together 63 respondents filled it in. The survey wasn't a representative one: the partners decided to run a simple online survey with teacher, to collect information in a wider range beside the interview-based investigations from the partner countries. The questions were also about the availability and

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usage of the textbooks in the partner countries, and how far were the teachers prepared for applying active teaching methods like project-based learning; new assessment methods, like peer assessment; freely available digital learning contents (OERs) and their awareness of the needs for educational changes in order to reflect on the needs of the labour market of the 21st century.

The link to the questionnaire was shared with the teachers by emails and in professional or social online groups. Out of the 63 respondents, 29 came from Hungary, 21 from Italy and 12 from Germany.

The detailed analysis of the result was published in a distinct document, we include only the final conclusions, based on the research questions.

- *Q1: How far the standard textbooks are usable in teaching? Are the textbooks offered for VET are relevant regarding the new trends and changes in the professions?*

Most of the textbooks are outdated, the curricula do not contain enough information about new trends and technologies. ("*The official and good quality printed textbooks available for several subjects, but there are some subjects that unfortunately lack them*."). The teachers are forced to develop their own digital learning material if they want to keep track with the rapid changes of the industry/economy/technology.

The main conclusion from this result is connected to Q4, it demonstrates the need for developing advanced digital competences of teachers. The other very important conclusion cannot be solved inside the schools: beyond the daily routine, the teachers should have more time for creative work and professional development as earlier, and improving their ability for sharing and reusing open educational resources is crucial.

- *Q2: Project-based learning method is perceived one of the most relevant teaching methods for the effective vocational education. How far are the teachers experienced in applying PBL in their practice? Are the teachers collaborating in projects with other teachers?*

The vast majority of teachers claimed that they are not familiar how to apply project-based learning, only a few of them run projects with their students frequently. The collaborative projects with other teachers are not integrative part of the practice of the schools. As PBL is key in vocational education for developing soft skills of students and increasing collaboration with industrial partner, based on the results we can agree, that there is a need for professional and pedagogical developments of teachers in this field and also for enriching their digital toolbox..

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- *Q3: The 21st century vocational education is called to change the traditional assessment (summative) methods to more innovative methods like formative methods, like peer-evaluation or portfolio-based evaluation. Are the teachers aware of the needs for changes? Are they applying such innovative assessment?*

There are teachers who apply innovative assessment methods, but more than 50% of the respondents have no information about the innovative methods, and other 51% who have heard about it but don't know how it works. However, the quality of learning in VET cannot be significantly improved without fundamental changes in assessment the learning outcomes of students. There is a strong need for professional and pedagogical developments of teachers in that field.

- *Q4: Digital tools and applications play important role in developing digital skills and transversal skills of students. What kind of tools and how often the teachers applying digital tools in their teaching practice? Are the teachers developing own digital learning materials for their teaching?*

The teachers are agreeing that digital tools can support developing soft skills of students, however, most of them evaluate their own digital competences as middle level. The form of digital learning material is mostly Office document (XLSX, DOCX, PPT), only some of them create advanced digital contents, like videos, online quizzes. They are not collaborating in such developments, and vast majority of them has never joint to online networks. The results clearly shows that there is a strong need for developing their digital competences and utilizing the power of technology in improving learning.

- *Q5: Are the teachers aware the needs for fundamental changes regarding teaching methodology, the effective use of technology in developing soft skills, increasing collaboration among the teaching staff?*

The figures underline that most of the VET teachers are fully aware of the demand for fundamental changes in their teaching methods, they understand that there is a need for innovative approach in pedagogy because of the new learning attitudes of the millennials. They recognised the importance of high-level soft skill to make successful their students on labour market and most of them agree, that applying digital tools is useful for that. At the same time, they say, that they aren't prepared for meet the demand without support, they need more time for developing their teaching methods and their digital toolbox.

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Conclusions

The target group of the project are the teachers, who are key actors in turning the vocational education more agile and responsive, "resilient and future-proof in order to better adapt to dynamic labour markets, to strengthen personal flexibility and progression, and to increase the attractiveness of VET by making it more modern and enhancing digital skills in a globalised world."[1]

The comprehensive needs-analysis integrates the results of a desk-research, the study of the VET systems of the partner countries, online survey with teachers, and interview based-survey with teachers, students, and companies.

VET Systems

Comparing the vocational education and training systems of the partner countries, the following are the most important similarities that enable and support the common tasks undertaken in this project:

- *All three countries have vocational training at levels 3, 4 and 5 of the EQF*
- *In all three countries, the training and outcome requirements are set out in learning outcomes (on the basis of which training and outcome requirements can be compared)*
- *In the partner countries, learning outcomes requirements are centrally defined, but there is scope for designing training programmes with the possibility of creating an 'institutional programme' (including the involvement of the diaspora training partner as a partner)*
- *Dual training, cooperation with entrepreneurs/economic actors on practical training is a priority in all three countries*
- *An important guiding principle for all EU countries is to develop students' knowledge and competences in line with 21st century labour market requirements.*

The VET systems of the partner countries have differences as well, however, there are common problems and initiatives (like focus on work-based learning, practice-oriented approach in teaching, focus on widening the collaboration with the industry and the dual system), for which the project results can offer possible solution all partners can contribute to and benefit from at the same time, and we can learn from each-other as well. The VET system faces similar problems in each partner

[1] **Achieving the European Education Area by 2025 (2020)** COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIALCOMMITTEE AND THE COMMITTEE OF THE REGIONS **on achieving the European Education Area by 2025** {SWD(2020) 212 final}

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countries, the expectation of giving quick response to the needs of labour market is the same for each country, while the answer and the present state can be different.

Expectation of the labour market against the young employees

One of the most important conclusions came from the interviews with the companies. All responses from the surveyed enterprises confirmed the conclusions of other targeted research that the biggest problem for the labour market is not the lack of the up-to-date occupation-specific knowledge, but rather the lack of so-called "transversal skills" (such as high digital skills, entrepreneurial and management skills, collaboration and communication and problem-solving skills) needed to adapt to changes in the workplace.

"The points important to the farmers from a fresh graduate were mostly soft skills: reliability, interest in personal development, critical faculties, perseverance, practical skills. Perseverance and being able to accept even negative critics are important skills, while practical skills were mentioned last due to the dual system of apprenticeship in Germany, where there is a big concentration on practical learning. Communication skills seem especially important because farmers must communicate with clients, suppliers, employees."

The Italian companies declared that they are not missing technical competences, but only missing/needing for more workforce. When asked about missing competences, they mentioned project management theory and practice that is not the part of the trainings. Independently from the profile, the companies keep good verbal communication skills, self-awareness, independency, logical thinking, precision, stress-resistance, adaptivity highly important.

The Hungarian IT related companies claimed their expectations in management skills, project-based thinking, good problem -solving skills, ability to work in a team, good communication skills, systematic approach, skills in digital technologies, up-to-date knowledge and willingness to undertake further training. They also lack other skills, like project-based thinking, problem solving, multidisciplinary approach, the ability to estimate expenditure, IT literacy, documentation skills and practical skills.

The main conclusion is aligned with the results of other European studies and research: the companies have less interest on **occupation-specific** skills, because this knowledge become obsolete very quickly and more on transferable skill, including high level digital skills, entrepreneurial and green skills as well others necessary for adapting to changes in the workplaces.

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Many of them criticized the teaching methods, they said that instead of grading test papers teachers at schools should plan real-life implementation processes with alternative ways of evaluation. Students should participate actively in the teaching/learning process so that they would have their inner motivation, awaken by real-life projects, following a theoretical foundation period.

Openness for collaboration

The questions on the willingness for collaboration received mixed answers, some of the companies claimed that they hadn't capacity for taking part in curriculum development. In Germany the farmers mostly reject such collaborations, but in Hungary they said they would contribute with involving students in workplace projects or providing tutors or presentations for schools. 6 out of 10 Hungarian companies would participate in digital curriculum development and 9 of them would participate in defining project task for students.

Relevance of textbook

Reviewing the results of the interviews with teachers in the partner countries, we found that, regardless of the national VET systems, teachers are not satisfied with the textbooks available, but we also found that for some vocational subjects there are no up-to-date textbooks available at all. One of the reasons for this problem may be the rapidly changing and constantly evolving technology of industries (especially in IT and telecommunications subjects).

The result of the in-depth survey clearly shows that the learning materials and textbooks available for the selected sectors are mostly outdated, the development of the standard textbooks cannot follow the rapid changes of the technology, and the textbooks aren't always motivating for the new generation of students and include only a few practical or real-life examples.

To overcome this lack, they need to compile their own teaching materials (such as slides, and projects developed specifically for their class group and updated each year) for which they use resources on the Internet although their digital preparedness is very diverse and most of them only use it to recommend content to the students. In general, they prepare their own PPT based on their own research, taking into account the standard curriculum created by the institution.

According to the respondents teaching for IT qualification programming languages are constantly evolving so it is not easy to find updated material that groups topics in a coherent way, so sometimes teachers have to combine a mix of resources. The Hungarian teachers claimed that in **programming**

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there is no available coursebook for secondary school students /on python/and the development of course materials matching the curriculum requirements is done by the individual teachers.

The students prefer using digital training materials to paper-based textbooks. they would like to learn by doing, implementing real-life projects, more practical tasks and projects they specified that these projects must be real-life projects not hypothetical.

Using digital tools

Although generally teachers would prefer using digital tools many schools don`t have an adequate digital equipment yet, neither do so all students/participants. The application of digital tools in class mostly depends on whether there is eligible technical environment and devices for students. Some of the classrooms are equipped with a projector but in most of them there are only traditional school boards. Hungarian teachers all think that students should be provided with tablets.

The use of digital tools in the classroom depends mostly on the availability of the right technical environment and tools for the students.

Teaching methods, innovative practice in assessing students' performance

Most cases, teachers use frontal teaching method to teach theory besides the practical part. (HU)

Many teachers admit they do not have the necessary knowledge and practice in innovative teaching and learning assessment methods. (HU)

Most teachers admit that they lack the necessary knowledge and practice in innovative teaching and learning assessment methods.

Most respondents admit that they are not sufficiently prepared to apply innovative teaching-learning and assessment methods, and do not have the necessary knowledge and practice to do so.
To evaluate the students, the teachers use the traditional grading forms, and they mentioned the basic exam as an evaluation method. They all seem to prefer this, and they do not require any other evaluation system. (HU)

Focus on soft skills

Although there is a defined need for soft skills by the companies asked, which should be taught and trained, for example communication skills, there is no specific preparation of the teachers on delivering soft skills.

Teachers are generally not prepared for developing the soft skills of students - they would need trainings to be able to do that more consciously (methodology trainings).

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As institutional devices are not modern enough, there would be a need for more profession-specific applications, programs and tools for the efficient training and exam preparation (device development or outsourced training to a partner company would be a solution).

Some teachers, who have come from the business world or are part-time teachers while working for a company (e.g., in Italy) are perfectly aware of the demands of the job market while many VET teachers seem to be only loosely tied to the business world.

From the interviews, we can conclude that teachers and trainers are aware of the need to continuously improve their methodological and professional skills and to regularly maintain their digital tools to meet changing requirements.

There are many general and vocational subjects where new innovations are not included in the traditional textbooks published many years ago, which are now outdated and generally written in an academic rather than practical approach. The gap between the needs of the labour market and what is offered by standard vocational education and training curricula is therefore constantly widening.

Summary

The final conclusions are in accordance with our main assumptions as follows:

> The educational strategies and initiatives of the EU call for vocational education to become more agile than ever before and to offer more flexible learning pathways and short micro-courses beyond their traditional standard curricula and training programmes. However, the VET teachers need effective support for developing and delivering micro-courses, creating digital learning materials, and running real-life projects with students and developing of students' transversal skills.

Based on the results of the in-depth survey, there is a clear need for a new model of collaborative learning content development for all participants in the learning process (teachers, students) and end-users (companies) in the selected sectors, regardless of the differences between the partner countries' VET systems.

It can also be concluded from the surveys that, in addition to pedagogical preparation, a large proportion of teachers need to continuously develop their professional knowledge and digital skills to produce appropriate learning materials and teach their subject effectively.

To develop students' transversal skills, teachers need to use innovative teaching-learning and assessment methods and learn how to apply them.

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The online survey data also confirm that the majority of teachers in VET are fully aware of the need for fundamental changes in their teaching methods and understand the need for an innovative approach to pedagogy in the face of new learning attitudes of millennials. They recognise the importance of high levels of human skills to help their students succeed in the labour market, and most agree that the use of digital tools is useful for this. However, they admit that without support, they are not ready to meet the demand and need more time to develop their teaching methods and digital toolbox.

These problems are focused by VETProfit project, and the results of the needs-analysis survey provide input for designing the products and outcomes of the project to ensure that the results will be relevant to the needs of the target group: the teachers of the vocational education.

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Annexes

Annex 1: Interviews in details

Interview with teachers

Germany- DEULA

6 teachers teaching at different EQF levels (1-5) 2 of whom teach general subjects and 4 teach professional subjects related to agriculture and economics took part in the interview.

They agree on the importance of improving their students' soft skills. They want their participants to develop their communication skills (oral/written) with different target groups (boss, colleagues, clients, suppliers,). They also want them to develop critical awareness and logical thinking to assess critically a professional action.

Only two of the interviewed teachers use above all paper-based material such as textbooks and copies (which may come from the internet). Two teachers mix their tools between paper-based and digital tools, but with a surplus of digital materials (85%). One teacher uses about 100% digital materials, only the written exams are on paper. From the digital materials available they mostly use professional websites, videos, copy templates, self-created material, eLearning-tools, LMS. They mentioned gaps in terms of textbooks, digital learning materials. The teaching methods used by the group of teachers is diverse. Oral and written assessments enfold in a grade 1 to 6 (1 being the best). Moreover, in German schools there are some soft skills evaluated.

Although generally teachers would prefer using digital tools many schools don`t have an adequate digital equipment yet, neither do so all students/participants.

Italy - JAC

5 teachers were asked during the interview, 3 of whom are higher education VET teachers and 2 work in adult education.

Most teachers create and use their own material, such as slides, and projects developed specifically for their class group and updated each year. All interviewed teachers use books or manuals chosen individually to some extent, but they are either optional or of secondary importance compared to the material developed by the teachers themselves. Computer language is constantly evolving so it is not

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always easy to find updated material that groups topics in a coherent way, so sometimes teachers have to combine a mix of resources.

Teachers organize their lessons as a mix of theory and practice, all much more oriented towards the practice. All teachers claim to use active learning, learning by doing, project-based learning, and collaborative learning as teaching/learning methodologies. In the ICT field practical and project-based learning is way more effective than the classic frontal theoretical lessons.

According to most interviewed teachers, the method that works best is one in which theory and practice are interconnected.

Teachers claim that it is difficult to bring the preparation of young people closer to the needs of the jobs market. The students start the EQF5 course with a lot of theoretical background but without knowing how to use the tools of this profession or without knowing how to use technical and professional terms.

They admit that the teacher must constantly update his/her lessons to keep up with market trends and suggest that the main method of assessment should be to create an application or to carry out a project.

Hungary – PREMO; MAKESZISZ

10 teachers were involved in the interview 4 of whom teach at EQF level 5 and 6 teach at EQF level 4. They teach IT and horticulture related subjects.

The use of paper-based textbooks and digital teaching materials vary in the different subjects: in **Digital culture** teachers use smart books and develop their own materials while in **Programming t**here is no available coursebook for secondary school students /on python/and the development of course materials matching the curriculum requirements is done by the individual teachers.

There are no or very few prepared sample projects available, no centrally developed sample projects either.

Students can acquire knowledge by learning and doing (tasks matching their age group and competences). Teachers use project work, pair work, individual work and frontal work as well.

Teachers would welcome to have online learning material aiding practical education, available for everyone + task collection could help the teaching/learning process. A sample task sheets in accordance with the training and exam requirements would be necessary. A unified book, tasks and

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related digital knowledge base would be needed. In general, more modern devices and applications, computer labs would be needed for the practical training.

7 of the teachers interviewed have not used any different measurement methods in their schools. Teachers are generally not prepared for developing the soft skills of students - they would need trainings to be able to do that more consciously (methodology trainings). As institutional devices are not modern enough, there would be a need for more profession-specific applications, programs and tools for the efficient training and exam preparation (device development or outsourced training to a partner company would be a solution.

Teachers admit they do not have the necessary knowledge and practice in innovative teaching and learning assessment methods.

Teachers interviewed agree that some parts of the curriculum are completely outdated, and other parts are unnecessary for the studied profession and uninteresting for the students. The problem with the textbook is the same as with the curriculum: it covers almost everything, but in such a superficial and confusing way that none of the interviewed teachers use it for teaching. In general, they prepare their own PPT based on their own research, considering the standard curriculum created by the institution.

Some of the classrooms are equipped with a projector but in most of them there are only traditional school boards. Teachers all think that students should be provided with tablets.

Most cases, teachers use frontal teaching method to teach theory besides the practical part.

To evaluate the students, the teachers use the traditional grading forms, and they mentioned the basic exam as an evaluation method. They all seem to prefer this and they do not require any other evaluation system.

From students

The assessment-methods used by the teachers are rather classic.

Students would like more interdisciplinary teaching at school because it is more interesting.

Interviews with students

Germany DEULA

5 students apprentices) were involved in the interview 4 of whom are learning agriculture and horticulture at EQF level 4 and one at EQF level 5.

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To learn theoretical knowledge, in class are used above all scripts and working sheets, both annually updated and for the latter often in relation to practical tasks. They also use some books, but they are sometimes out of date. Working sheets are used to work on in groups or with a partner, comparing the results in a final discussion in class. During the pandemic situation also digital learning tools were used and in the vocational school at Hildesheim, due to the hearing problems of the students, they use iPads and sign language. Only one student (the one with hearing problems) prefers digital learning forms to paper based ones.

Students reveal that there are almost no projects or practical lessons in agriculture/ horticulture except for ornamental horticulture subject.

The teaching methods teachers use are a mixture of self-discovering learning, guided learning and blended learning. The assessment-methods used by the teachers are rather classic.

Students would like more interdisciplinary teaching at school because it is more interesting.

The dual system of apprenticeship strengthens the practical competences, so that the apprentices feel rather well prepared for professional practice.

Italy - JAC

5 students in possession of high school diploma (EQF 4) and enrolled in the 1st or 2nd year of the "Software Development" course (EQF 5) were interviewed.
There is a general satisfaction on the evaluation methods and on the real-life professional experience brought by teachers in class. The professionality and availability of teachers is widely considered the best feature of JAC's course.

All students confirm that they don't use manuals or books, but only slides prepared by the teacher for the course. In some modules of the course, the teacher suggests books to students who want to go in depth in some theoretical topic, while in other modules there is an official manual, but it is not mandatory to use it. Students use their own computers in class.

Students develop their practical competences by being assigned with small IT projects, or they complete a part/section of an existing bigger IT project. Their teachers come from the business so they can prepare them for real-life work. Exercises are done together in class or in groups or sometimes at home on an individual basis.

All students were quite satisfied with the overall teaching method though they would like to work on bigger and more realistic IT projects rather than on smaller fictional projects.

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Students claim that there is a final exam at the end of each module and that the exam is a project assignment involving all students.

All students were satisfied with the general assessment methods, except for those who have been assessed through the multiple-choice quiz, as they think it does not reflect the technical competences and soft skills acquired during the course.

Hungary – PREMO; MAKESZISZ

15 students, 5 9th and 5 10th and 5 12ths' grades were interviewed aged 16-19, learning at Level EQF 5, majored in IT and telecommunications and horticulture and gardening.

They say that there are no coursebooks available, which makes it difficult to learn programming and other IT subjects. There are some online tutorials /materials, but students would need more guidance what to find and where. They can mainly learn from the online materials suggested by teachers, or they find tutorials etc. for themselves. Teachers prepare the learning material themselves, which is shared via Moodle. However, the material is very often not structured enough for students, they would need more guidance in where to find what.

Students would need better-structured course material (theory + real-life practice tasks), more guidance from teachers; more practical lessons to obtain adequate practice.

Students would prefer a more complex evaluation (step-by-step evaluation, giving an overall picture of the students' work), a system that would motivate them more than the present grading system.

According to the interviewed students, teachers usually use their own PPTs, YouTube videos, and printed sheets during education as students also agree that textbooks are useless. They only encountered a frontal form of education. Most of them say that they would prefer practice to theoretical education and want to complete more project tasks in order to learn more effectively.

They would like to see that their teachers can work independently and not bounded by strict central or local regulations. Some of them would prefer more application of digital tools in the classes but with the stipulation that these should not be self-serving.

As regards to assessment, students seem to be satisfied with the old numerical grades they receive from the teachers with some verbal evaluation sometimes however they haven't experienced any other methods.

Interviews with companies

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Germany - DEULA

2 farmers were interviewed both owning cattle farms and selling their own products.

One of them has a father/son-farm and employs 2 part-time milkmaids and one apprentice. Moreover, there is a trainee on the farm now. The other farmer changed to organic farming in 2018 and work with his father and 2 trainees.

In North of Germany young people start apprenticeship in or even studying agriculture, in general do this to have afterwards their own farm, not to be employed.

The points important to the farmers from a fresh graduate were mostly soft skills: reliability, interest in personal development, critical faculties, perseverance, practical skills. Perseverance and being able to accept even negative critics are important skills, while practical skills were mentioned last due to the dual system of apprenticeship in Germany, where there is a big concentration on practical learning. Communication skills seem especially important because farmers must communicate with clients, suppliers, employees.

They would like the schools to equip the students with: communication skills, perseverance, management skills, earlier specialization (e.g., in each animal species). As they say, young people should learn less content they will not need in their professional life.

Concerning early specialization, they agreed in the fact that it is better to get first an overview of possible professional activities.

Farmers choose their apprentices/workers only after trial work. They will have a look on the grades from school, too, but to get an impression if they can work together for almost one year (in the case of apprentices), trial work is the tool. They can see the motivation, the practical skills, the sympathy (important in terms of good teamwork) in doing the job.

One of the farmers interviewed would involve himself in the development of a project, concerning the use and interpretation of the data of a cow-manager while the other has no time for taking part in such.

Italy - JAC

2 companies (SMEs) were interviewed, an operating worldwide in supporting organizations, projects and networks to strengthen collaboration and learning through Knowledge Management while the other company operates in Europe in the field of software engineering; provision of modern data solutions for companies & organizations; embedding IT competences in companies and organizations.

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Both respondents focused especially on the soft or transversal skills that they seek for in newly hired employees or interns, like practical sense; proactivity; critical thinking and questioning; autonomy when performing their tasks. They say that graduates usually have the required technical skills but are in short of the soft skills mentioned above.

Both companies declared that they are not missing technical competences, but only missing/needing for more workforce. When asked about missing competences, they mentioned project management theory and practice that is not the part of the trainings.

According to the interviewed companies, software development courses need to be developed with the consultancy of representatives of the job market, through targeted interventions of ICT professionals and SMEs, especially on certain aspects and technologies that characterize the work practice.

Only one of them seems interested in cooperating with schools, while the other regards it too time consuming. They think that professionals don't have much time to offer so the course must be perfectly organized, and the intervention of the SME must be coherent with the level of the course.

Both of them are open to define a specific task for students as long as they are informed on the subject taught in the course and on the level of the topics.

Hungary – DRDC, PREMO, MAKESZISZ

In Hungary 10 companies: were interviewed: seven from the IT sector (IT consultancy, computer programming, IT services) with micro, small or medium and 2 from the agriculture sector (processing and preserving of fruit and vegetables, producer of ornamental and vegetable plants) with micro or medium size and a small-size company dealing with consultancy.

IT related companies' expectations against the new recruits are: management skills, project-based thinking, good problem -solving skills, ability to work in a team, good communication skills, systematic approach, skills in digital technologies, up-to-date knowledge and willingness to undertake further training. They also lack other skills, like project-based thinking, problem solving, multidisciplinary approach, the ability to estimate expenditure, IT literacy, documentation skills and practical skills.

Agriculture related companies expect more digital skills from the new recruits as well as concrete practical knowledge (even if trivial) that is essential for everyday simple work.

Independently from the profile, they keep good verbal communication skills, self-awareness, independency, logical thinking, precision, stress-resistance, loadability highly important.

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Companies suggest that there should be more autonomy for teachers, more up-to-date theoretical training and preparation for the changes that will take place in the next 5-10 years, closer cooperation with companies and the student's participation in internships and dual training could improve the quality of education. For further motivation of students, they suggested higher admission scores, financial rewards for participation in real projects and practical programs before training to familiarize students with their chosen profession.

They say that instead of grading test papers teachers at schools should plan real-life implementation processes with alternative ways of evaluation. Students should participate actively in the teaching/learning process so that they would have their inner motivation, awaken by real-life projects, following a theoretical foundation period.

Companies would contribute to these operating as a training site, involving students in workplace projects or providing tutors or presentations for schools. 6 out of 10 companies would participate in digital curriculum development. One company does not wish to cooperate only due to lack of capacity. 9 of them would participate in defining project task for students.

Annex 2: Interview questionnaires

Interview with teachers

The aims: analysis of textbooks, teaching materials, teaching and learning methods for students in the sectors in general and for the selected subject/topic of the sector/profession.

The suggested topics were:

- *Knowledge content taught (based on learning outcome criteria), skills expected (development of professional and "soft" competences based on learning outcome criteria)*
- *Applied books, professional materials, free-to-use learning materials, curricular elements*
- *Tools used (digital and traditional) teaching*
- *Centrally developed model projects, self-designed projects*
- *Applied teaching and learning methods, own practices (if any)*
- *What are the gaps in terms of textbooks, digital learning materials (in general and for a given subject)?*
- *What (tools, methods) would best support teaching and learning in the school or for a given subject?*

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- *Methods (other than grading) and tools used to measure and assess students' knowledge and competences in the institution and/or in the subject.*

Interview with students

Aims: analysis of textbooks, teaching materials, teaching and learning methods for students in the sectors in general and for the selected subject/topic of the sector/profession.

The suggested topics were:

- *On what basis (literature, books, teaching materials) do students learn theoretical knowledge?*
- *What tasks, projects, practical demonstrations, etc. help to develop practical competences?*
- *What tools (traditional, digital) support learning?*
- *How is the learning material processed - by what methods?*
- *What is most lacking in order to learn effectively?*
- *What is most lacking for you to obtain adequate practice in this subject?*
- *Do your teachers use other types of assessment methods than grading?*
- *Are you satisfied with the teaching and assessment methods used by your teachers?*
- *What suggestions would you make regarding teaching? (method, teaching material, teaching tools, cooperation, etc...)?*

Interview with companies

Enterprises/companies defined what are the knowledge, skills and competences they expect from young professionals just entering the labour market.

The suggested topics were:

- *What do you expect from a new employee who has studied and passed the exam of the qualification of ……,?*
- *What are the competences the company is missing when employing young people who have just obtained a professional certificate?*
- *Do you see an opportunity to make a real change in the quality of vocational education and training and to make young people take responsibility for their own learning and be motivated to develop?*

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- *In what ways can and will you help to ensure that young people are better prepared for their profession?*
- *Would you cooperate with schools in the development of digital curricula?*
- *Would you be open to define a project task for students, what prepares them for acting more effectively in a workplace, and what could help you as well to get a picture about the knowledge, skills and competences of a newly certified young person who just passed the exam?*

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Annex 3 - Questionnaire of online survey with teachers

1. In which industrial sector do you teach?
2. What is the type of your VET institution?
3. What subjects do you teach?
4. What problems have you detected regarding the learning materials related to basic training?
5. Appr. what percent of the teaching materials you use are digital materials?
6. How well do you know project-based learning method?
7. How often do you apply project-based learning as a teaching method?
8. To what extent do you know and apply innovative assessment methods other than numerical classification (e.g. self-assessment of students, peer review, evaluation of presentation based on pre-defined criteria, use of checklists)?
9. Has there been any cross-sectoral collaboration in your teaching practice?
10. To what extent is there a cooperation between the different professions and subjects implemented at the level of the teachers in your institution?

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Project Summary

Multidisciplinary, Project-based Digital Learning Content for VET

Basic data

Title: Multidisciplinary, Project-based Digital Learning Content for VET

Acronym: VETPROFIT

Project ID: 2021-1-HU01-KA220-VET-000025350

Partner countries: Germany, Italy, Hungary

Coordinator: iTStudy Hungary Ltd.

Duration: 01 November 2021 – 31 October 2024.

Background

Vocational education and training (VET) has a key role to play in preparing young professionals for the challenges of a rapidly evolving global and digital economy. However, education often operates in isolation from the business world, with a widening gap between the skills provided by schools and those required by employers.

The labour market needs practical knowledge, and textbooks tend to be dominated by theory. Textbooks are not motivating enough for students born into the digital world and contain very few real-life examples from work situations. While most workplaces expect staff to work in a project-oriented way, the project approach and its associated forms of work are still not integrated into training, and a significant number of trainers are not yet prepared to apply the project approach. The multidisciplinary approach is difficult to integrate with traditional teaching methods, even though young graduates need to apply knowledge and skills from different subjects at the same time to solve workplace problems. While employers expect prospective employees to work in teams and on projects, the project method and related forms of work are not widespread in VET and project-based teaching methods are often missing from the toolbox of VET teachers.

Target groups

- VET- schools' leadership
- VET teachers/trainers

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- Companies (Agriculture and IT sectors)

Beneficiaries

- VET students
- Employers

Objectives

The aim of the project is to reflect the needs of the labour market in vocational education and training, to prepare teachers to work with companies to develop project tasks for students and future employees to solve real problems proposed by them. To achieve this objective, the partneship:

- *review the curriculum, learning materials and teaching methods used in the initial training of IT and Agricultural sectors in the partner countries.*
- *train VET teachers of these sectors about the project method, related digital tools, innovative assessment practices and digital content creation.*
- *assign real-life project tasks for VET students, in close collaboration of teachers and labor market representatives.*
- *create a repository of project-based, re-usable, high-quality, motivating digital learning contents with an interdisciplinary approach.*
- *prepare students for successful project implementation by designing and delivering mini courses for them;*
- *create a model to be published as a guide for teachers of other VET institutes.*

Results

R1 – A study on 21st century relevance of textbooks and learning content

R2 - PBL with interdisciplinary approach – blended course for VET teachers

R3 - Labor market-oriented projects for students

R4 - Repository of re-usable digital micro-learning content for VET

R5 - Mini-courses and projects for VET students

R6 - Methodology of developing, publishing and re-using digital micro-learning contents – a guide for VET expert teachers

Partners

iTStudy Hungary IT Education and Research Centre. Hungary

DEULA - Nienburg GmbH, Germany

Fondazione ITS – JobsAcademy, Italy

Association of Hungarian Horticultural Vocational Training Institutions, Hungary

Premontre Vocational High School, Technical School and College, Hungary

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