

European Commission

Digital Transformation of VET

WORKSHOP

Authors: C. Herrero, D. Villar Onrubia, J. Cosgrove, S. Kluzer, C. Centeno, J. Castaño Muñoz, S. Romero Rodríguez, C. Moreno Morilla, L. Weikert García, A. Arroyo Sagasta, A. Zubizarreta Pagalday, D. Wisniewski, N. Fabe.

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Abstract

Vocational Education and Training (VET) is a natural bridge between education and the world of work. It is the right place to equip future and current workforce with the necessary competences and skills, including the digital ones, for the jobs of today and tomorrow.

The VET digital transformation is of paramount importance in several ways: on the one hand, it can ensure we can grasp the jobs opportunities that will come with the digital transformation. On the other hand, learners with the necessary digital competences can be a transformation vector in companies, especially in small and medium enterprises (SMEs).

In this workshop, participants have analysed different elements related to the digital transformation of the VET sector from research, to inform with evidence future policies that could ensure EU VET systems remain competitive and provide the best training to citizens.

Acknowledgements

The workshop's success was driven not only by the generated information and knowledge, but also by the meaningful discussions and debates within and beyond the sessions. The participants' outstanding attitude and cooperation were the primary factors behind this achievement. Our sincere thanks to all of them.

We are profoundly grateful to the Digital Education and Skills (DES) team: Eleonora Bertoni (co-organiser of the workshop), Clara Centeno, Jude Cosgrove, Anastasia Economou, Georgios Kapsalis, Daniel Villar and Lilian Weikert. Special recognition to Romina Cachia (DES team leader) and Michele Vespe (T1 Acting Head of Unit) for their support.

Final thanks to Javier Picón for the logistics and preparatory work, and Carmen Capote for the graphic design work.

1 Introduction

On 7 and 8 March 2024, the Digital Education and Skills Team (Digital Economy Unit) of the European Commission's Joint Research Centre (JRC) organised the 'Digital Transformation of VET' – onsite workshop.

Vocational Education and Training (VET) related experts, policymakers, practitioners and professionals from international organisations, academia, research centers, private sector and other institutions, together with the European Commission staff exchanged, discussed, and worked around the main topic of digital transformation of the VET sector.

The Digital Education and Skills Team has been working in the last months in a range of areas aimed to support the digital transformation of the VET sector: including emerging trends and technologies, enablers for the digital transformation, the self-reflection tool SELFIE WBL (for work-based learning), some VET systems case studies and the potential relation between VET and the concept of professional digital profiles (based on the DigComp framework).

The main goal of the workshop was to gather several experts from different sectors with diverse backgrounds, knowledge, and expertise to contribute to the discussion during the meetings, which aims to exchange knowledge and share experiences debating, among peers, the enablers, and challenges for the digital transformation of the VET sector in general, and the aforementioned topics.

Overall, the discussion, work and feedback collected from the workshop have been used to fine-tune the findings from the JRC ongoing work around digital transformation of the VET sector and it will be included in the related publication (ongoing work).

The event, was kicked off by Michele Vespe, Acting Head of the Digital Economy Unit. Next, Romina Cachia, Digital Education and Skills team leader, presented the different lines of research of the team.

The workshop was organised in five different slots:

1. Enablers of digital transformation
2. Emerging trends in VET
3. Professional digital profiles
4. SELFIE WBL guidelines
5. SELFIE WBL language adaptation to company contexts and gaps

The participants of the workshop are listed in the following figure:

#	NAME	ORGANISATION
1	Michael Horgan	European Commission, DG EMPL
2	Lydya Berrocoso	Ministry of Education, VET and Sport. Spain
3	Ana Hernández	INTEF
4	Rikar Lamadrid	Basque Ministry of VET
5	Iñaki Tellería	TKINIKA
6	Max Ehlers	UNESCO-UNEVOC
7	Stefano Tirati	EfVET
8	Carlos de Olague	FP Empresa
9	Miriam Korstanje	Katapult
10	Amaia Arroyo	Mondragon University
11	Ane Zubizarreta	Mondragon University
12	Jonatan Castaño	University of Seville
13	Celia Moreno	University of Seville
14	Soledad Romero	University of Seville
15	Daniel Wisniewski	EFEE
16	Nina Fabe	EFEE
17	Alma Shkreli	VET Consultant
18	Stefano Kluzer	All Digital
19	Malgorzata Kuczera	OCDE
20	Jenni Kuhta	Stadin AO
21	Alicia Miklavcic	SKUPNOST
22	Marika Peltonen	GRADIA
23	Erik Swars	Swiss Federal University for VET
24	Ana Ribeiro	AEVA
25	Tibor Dori	Euro Contact Business School
26	Jelena Konatar	Ministry of Education Montenegro
27	Danijela Scepanovic	Ministry of Education Serbia
28	Christiane Caneva	University of Geneve
29	Vassilis Siomadis,	IME-GSEVEE
30	Luiz Eduardo Leao	SENAI
31	Michail Papazoglou	CEDEFOP

Figure 1

List of participants in the workshop.

Source: own elaboration.

2 Enablers of **digital transformation in VET**

Speakers

- Jonatan Castaño Muñoz, University of Seville
- Soledad Romero Rodríguez, University of Seville
- Celia Moreno Morilla, University of Seville
- Lilian Weikert-García, Unisys

European job markets are changing due to globalisation, technology, and social shifts. While Industry 4.0 focuses on automation and intelligent production incorporating emerging technologies, Europe's vision is already on Society 5.0, prioritising human well-being in a technologically advanced world. VET is key for preparing citizens for society 5.0 and its labour market. By embracing digital transformation, VET can equip Europeans with the technical, digital, and social skills they need to succeed in a changing job market.

In a study commissioned by the JRC, the University of Seville investigated the key factors enabling digital transformation in VET. The research pursued the following objectives:

- Identify key elements for successful digital transformation in VET based on academic literature.
- Analyse existing initiatives and policies to understand its strengths and weaknesses for VET digitalsation.

By comparing and putting together results from theory and practice, the research aimed to identify enablers, challenges, and opportunities for effective VET digital transformation.

Contextual information

To understand the keys to successful digital transformation in VET, University of Seville researchers conducted a three-step study. First, they reviewed literature and reports to identify theoretical key elements, including academic papers and international organisation reports. Then, they identified and analysed best practices and real-world European initiatives as well as regional/national policies promoting VET digitalisation. A total of 19 initiatives were analysed. The selection of initiatives was not representative but was done on the basis of their impact and variety. Finally, they checked if the theoretical elements were present in the successful initiatives. This process helped determine key factors for effective VET digital transformation.

The preliminary results identified two major trends for a successful digital transformation of VET. First, the integration of digital technologies into teaching and learning methods to create more flexible and modern environments. Secondly, shifting the focus from digital skills to a holistic development that includes digital literacy, and soft skills. Developing them, the study identified thirteen preliminary key elements from the literature review and seven success factors from policies/initiatives analysis.

KEY ELEMENTS FROM LITERATURE REVIEW (preliminary results)
• Development and use of information systems • Digital skills for VET teachers and trainers • Digital skills for students • Development of socioemotional & transversal skills • Transformative potential of blended and online learning (including experiential methods) • Flexible accreditation mechanisms • Incorporation of emerging technologies • Digital technologies in career education and guidance • Promotion of the link between sustainable human development and technologies use • Tackling technology related gender gaps in VET • Ecological & strategic approach in VET • Changes of role of practitioners due to ICT • Use of digital resources
SUCCESS FACTORS FROM THE PRACTICE (preliminary results)
• Targeted needs and flexibility • Time relevance & use of state-of-the-art technologies • Collaboration • Communication, awareness & adoption • Continuous improvement and monitoring • Continuous professional development • Scalability & sustainability

Figure 2

Preliminary results.

Source: own elaboration.

Session methodology

The research findings were presented during a 1.5-hour session in the workshop. This session aimed to gather feedback, refine the results, and validate the research conclusions.

After a presentation of the study and its main results, a group work session followed where the workshop attendees were divided into 5 groups of 6 people to discuss the results and answer the following questions:

Do you agree with the key elements presented? Can they be improved? How?

- Which are more relevant?
- What are their implementation enablers and barriers?
- Do you have information on any extra interesting initiative/policy that can contribute to identify elements?
- Is there anything missing in the study?

Discussions were held for 30 minutes using structured templates (See figure 3). Each group designated a notetaker to capture key conclusions within the template. Subsequently, designated group rapporteurs presented their main points and conclusions during a plenary session. This open forum allowed other participants to engage in debate and contribute further insights.

Figure 3

Structured template.

Source: own elaboration.

KEY ELEMENTS FOR DIGITAL TRANSFORMATION IN VET

KEY ELEMENT	Enablers	Barriers	Good practices/initiatives	Importance (1 Low/10 High)
1. Development/use of information systems				1 2 3 4 5 6 7 8 9 10
2. Digital skills for VET teachers/trainers				1 2 3 4 5 6 7 8 9 10
3. Digital skills for students				1 2 3 4 5 6 7 8 9 10
4. Development of socioemotional & transversal skills				1 2 3 4 5 6 7 8 9 10
5. Transformative potential of blended and online learning+ Experiential methods and learning				1 2 3 4 5 6 7 8 9 10
6. Flexible accreditation mechanisms				1 2 3 4 5 6 7 8 9 10
7. Incorporation of emerging technologies				1 2 3 4 5 6 7 8 9 10
8. Digital technologies in career education and guidance				1 2 3 4 5 6 7 8 9 10
9. Promotion and consideration of the link between sustainable human development and technologies use (Industry 5.0)				1 2 3 4 5 6 7 8 9 10
10. Tackling technology-related gender gaps in VET				1 2 3 4 5 6 7 8 9 10
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)				1 2 3 4 5 6 7 8 9 10
12. Changes of the roles of practitioners due to ICT				1 2 3 4 5 6 7 8 9 10
13. Digital resources				1 2 3 4 5 6 7 8 9 10

Other Key elements:

Feedback from participants

In general, workshop participants concurred with the presented key elements for successful VET transformation, emphasising their interconnected nature and synergistic effect. Moreover, they observed that sev-

eral key factors partially overlapped. Recognising this redundancy both with elements identified from the literature and with elements from the initiative analysis, the research team consolidated the initial findings into a streamlined framework of eight key elements for successful VET digital transformation. Figure 4 illustrates this evolution.

CONSOLIDATED	PRELIMINARY
Holistic development of learners' skills	• PKEL: Digital skills for students • PKEL: Development of socioemotional & transversal skills • PSFP: Time relevance & use of state-of-the-art technologies
Teacher training for changing roles	• PKEL: Digital skills for VET teachers and trainers • PKEL: Changes of role of practitioners due to ICT • PSFP: Continuous professional development
Pedagogical and transformative potential of digital technologies	• PKEL: Transformative potential of blended and online learning (including experiential methods) • PKEL: Use of digital resources • PKEL: Incorporation of emerging technologies • PSFP: Targeted needs and flexibility • PSFP: Time relevance & use of state-of-the-art technologies
Flexible accreditation mechanisms	• PKEL: Flexible accreditation mechanisms • PSFP: Targeted needs and flexibility
Career Education and Guidance	• PKEL: Digital technologies in career education and guidance
Development and use of information systems	• PKEL: Development and use of information systems • PSFP: Continuous improvement and monitoring
Ecological approach and collaborations	• PKEL: Ecological & strategic approach in VET • PSFP: Collaboration • PSFP: Communication, awareness & adoption • PSFP: Scalability & sustainability
Inclusion and sustainable human development	• PKEL: Promotion of the link between sustainable human development and technologies use • PKEL: Tackling technology related gender gaps in VET

*PKEL: preliminary key element from literature; PSFP: Success factor from practice.

Figure 4

From preliminary results to eight consolidated key elements for a successful digital transformation of VET.

Source: own elaboration.

The importance of some aspects previously identified in the research was also reinforced and validated by the experts. They highlighted the importance of socioemotional skills for learners and teachers. Collaboration between public and private sectors was highlighted as vital to finance expensive educational technologies in VET. Additionally, experts stressed the value of open education in maximising the pedagogical and transformative potential of digital tools.

Furthermore, the workshop session was useful to highlight specific aspects within each of the eight consolidated key elements that had been given less attention by the researchers. These insights were incorporated into the research work to refine them. Examples include the significance of leadership for fostering an ecological approach and collaboration among institutions, the importance of teachers having at least an understanding of available technologies and the ability to discern which is more appropriate in each context or educational situation, and the critical role of inclusion in achieving sustainable human development within the context of VET digitalisation.

Conclusions

Workshop participants concurred with the initial findings, but also offered valuable insights for simplifying the list of elements and making their description more accurate.

This feedback allowed the research team to consolidate the initial findings into a final list of eight key elements for successful VET digital transformation.

Furthermore, participants emphasised the importance of the research itself beyond educational context. Since VET plays a crucial role in regional development policies, it can be a powerful driver of change and digitalisation at regional level.

Emerging trends in VET 3

Speakers

- Daniel Villar Onrubia (European Commission JRC, T1 Unit)
- César Herrero (European Commission JRC, T1 Unit)

On the future of technology in education

The session started with an overview of the science for policy report On the Futures of Technology in Education: Emerging Trends and Policy Implications (Tuomi et al. 2023), which discusses the profound impact of emerging technologies, such as Sixth Generation networks (6G), Artificial Intelligence (AI), and learning analytics, on education and learning. While the report adopts a cross-sectorial approach, it contains key points and implications particularly relevant to VET:

1. The Next Internet: 6G networks will merge physical and virtual worlds, potentially transforming VET through immersive, technology-mediated experiences that enhance hands-on learning and simulations.
2. Incorporating Extended Reality (XR) technologies to simulate DICE (Dangerous, Impossible, Counterproductive, Expensive) learning experiences into VET can provide several advantages and opportunities, by providing safe, cost-effective, and engaging learning opportunities. However, careful implementation that considers ethical, accessibility, technological, and pedagogical factors is key to success.
3. Data-Driven Learning: The increasing amount of data from digital learning platforms offers opportunities for personalised learning paths in VET, although it raises ethical concerns regarding data privacy and requires careful regulation.
4. Human-AI Interaction: AI can redistribute agency between learners and educational systems, providing personalised support and real-time feedback, which could revolutionise VET by enabling more flexible and responsive training programs.
5. Skills Development: AI's potential to automate tasks necessitates a rethinking of traditional skill definitions in VET. There is a growing

need for competences that AI cannot replace, such as creativity, problem-solving, and socio-emotional skills, which VET programs must prioritise.

6. Assessment Evolution: AI and learning analytics enable continuous formative assessment. For VET, this means a shift from traditional testing to more authentic assessment methods that better reflect practical skills and workplace readiness.
7. The New Trivium: With AI reshaping foundational skills like writing and mathematics, VET must adapt its curriculum to integrate AI tools into training processes, ensuring that students are prepared for an AI-augmented workforce.

In the workshop, it was discussed that VET programs must evolve to integrate these technologies, focusing on developing human-centered competences that complement AI and preparing students for a rapidly changing labor market influenced by technological advancements.

Emerging trends and technologies in VET

Based on the previous work, a new line of research was developed, with a more specific focus on VET. The goal of the work was to better understand current and future needs and anticipate potential policy implications in relation to emerging trends and technologies in VET.

In order to pursue this objective, we studied several Erasmus+ project on VET and COVE (Centre of Vocational Excellence) initiatives, to analysed practitioners' perspective in this regard.

Emerging technologies are transforming industries, and VET systems must adapt to keep pace with these changes. At the same time, emerging trends are also changing the digitalisation of VET.

Some of the basic findings are:

- VET is more exposed to digital changes than other education sectors due to its proximity to digitalisation in the economy.
- Changes in the workplace are the main drivers of digitalisation in VET, with technologies like AI, AR and VR bridging the gap between school-based and practical learning.
- Digital skills shortages are contributing to the shift towards using emerging technologies.
- Digital learning in VET has two distinct but overlapping aspects: using digital tools for learning and learning to use digital technologies used in industry, in other words, how digitalisation is affecting VET vs how VET can respond to this digital transformation process and needs.

Based on the evidence collected in this study, it is possible to derive six policy recommendations to consider, aiming to strengthen the integration of technology in VET and ensure that learners acquire the necessary skills for the future labor market.

1. Major upgrade in support for digitalisation: A significant investment in teacher education, software, and hardware is needed to build a strong digital foundation for VET. Without proper support, VET systems risk falling further behind technological developments in the workplace, making it increasingly challenging for teachers to keep up with the pace of change.
2. Funding organisations as intermediaries: Support should be provided for organisations that can function as intermediaries between technology research, innovation, employers, and the VET system. These organisations bring together stakeholders from diverse backgrounds and promote experimentation with technology, which is essential for driving innovation within VET.
3. Closing the digital gap: Policy makers should focus on bridging the gap between the digital worlds inside and outside VET, particularly for young people. Research in this area should be intensified to better understand how technology impacts learning processes and how young people should learn in the digital world.
4. Redefining the role of teachers: As emerging technologies change the relationship between teachers, learners, and technology, policy makers should initiate a dialogue to reconsider the role of teachers, especially in the context of AI. This may involve adapting VET institutions to better support the evolving needs of learners and teachers.
5. Addressing inequalities in digital access and skills: Further investments in digital tools should be made with a focus on compensating for the lack of resources and digital skills among disadvantaged groups. Ensuring equal access to digital technologies and high-quality teaching will help minimise social and economic divides that may be exacerbated by digitalisation in the workplace.
6. Embracing a proactive stance on AI integration: Policy makers should adopt a proactive approach to AI integration in VET, understanding the challenges and opportunities it presents. Keeping up with the rapid adoption of AI in the workplace is crucial to ensure that VET systems can positively influence the development and application of AI in educational processes.

These recommendations are to strengthen the integration of emerging technologies in VET systems, ensuring that learners acquire the necessary skills and knowledge to succeed in the rapidly evolving digital landscape. This will require significant investments in teacher education, funding for intermediary organisations, research into technology's impact on learning, redefining the role of teachers, addressing inequalities in digital access, and adopting a proactive stance on AI integration. The major goal is to support VET systems to better prepare learners for the challenges and opportunities presented by emerging technologies in the future labor market.

The speakers highlighted the significant role of artificial intelligence. AI is a transformative technology with both advantages and challenges for VET systems. Policy makers should adopt a proactive approach to AI integration, understanding its potential impacts and addressing the associated challenges to ensure that VET systems can effectively prepare learners for the future labor market.

Workshop

For the interactive part of this session, workshop participants were organised into groups of five people to engage in foresight thinking. The main goal of the activity was to encourage participants to reflect upon and discuss what a standard VET class day would look like in 2035. In other words, to design a potential scenario for VET in the near, but not immediate, future. Participants had to analyse varied factors impacting VET in the coming years, based on the current situation and on their own experience and knowledge.

As a first step, they had to define the context, the kind of VET institution they would be working on: location (urban, rural, country...), funding model (public, private or mixed), VET program, duration, and a chronogram. All these factors also defined the kind of VET delivery taking place on such a specific day for the requested activity. It was also necessary to define the persona involved in the potential scenario.

Then, it was the moment to define a potential standard day in a VET class in 2035. They had to reflect about the roles, tasks, and activities that teachers and learners would deal with, role of technology, VET delivery format, and any other elements that could be relevant to define the training process taking place in a classroom in 2035. A set of templates were provided to guide and capture the work of the groups. Half of the participants imagine the routines of future VET students, while the other half envisioned the work of VE teachers.

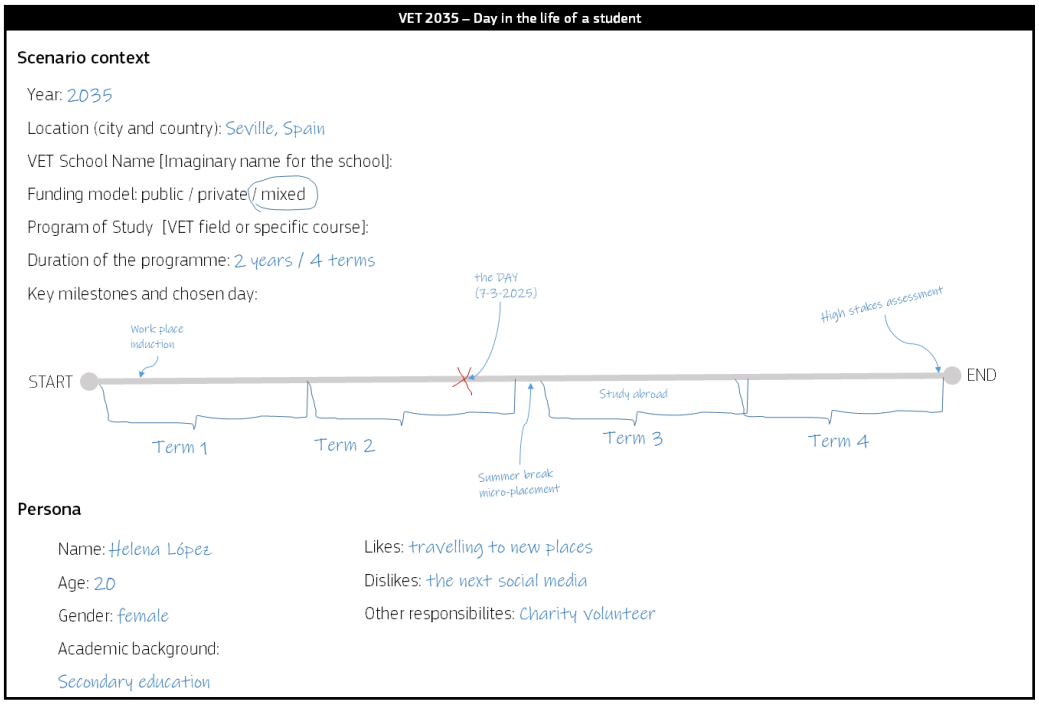


Figure 5

Scenario context canvas used in the slot on emerging trends in VET.

Source: own elaboration.

VET 2035 – Day in the life of a student

TIME	SITUATIONS/ACTIVITIES	PLACES	TECHNOLOGIES	PEOPLE
7.00 AM				
8.00 AM	Description of the learning situation (tasks, activities) performed by the student during this slot.	The facilities where the activity takes place.	Technologies in use	Others (if anyone) involved in the learning situation.
9.00 AM				
10.00 AM				
11.00 AM				
12.00 AM				
1.00 PM				
2.00 PM				
3.00 PM				
4.00 PM				
5.00 PM				
6.00 PM				
7.00 PM				
8.00 PM				
9.00 PM				
10.00 PM				
11.00 PM				

Figure 6

Timetable canvas used in the slot on emerging trends in VET.

Source: own elaboration.

Conclusions

Emerging trends in technology development and uptake will shape the future of VET, as society in the EU keeps evolving throughout the digital and green transitions.

This session gave an overview of key trends that are likely to influence the future of education and invited participants to envision a standard VET class day in 2035. Through collaborative foresight thinking, participants considered several factors such as institution type, location, funding model, program characteristics, and personas involved. They analysed roles, tasks, the role of technology, and delivery formats to propose a scenario for future VET education. Two canvases provided structure to the activity, capturing the groups' work, and helping them to imagine relevant practices and resources in the everyday life of VET teachers and students in about decade from now.

5 Professional digital profiles
Using DigComp as a tool for their development

Speakers

- Jude Cosgrove (European Commission JRC, T1 Unit)
- Stefano Kluzer (ALL DIGITAL, DigCompHub project)
- Clara Centeno (European Commission JRC, T1 Unit)

Context

The European digital competence framework for citizens (DigComp) is now in its fourth edition (DigComp 2.2, 2022) and is widely used across Europe and beyond. Notably, it is embedded in digital skills policies in about 22 EU Member States and in formal and non-formal education in at least 21 EU Member states. Implementation of DigComp is varied, ranging from high level usages, such as a conceptual organising framework for policies and strategies, to more granular uses, including the development of education and training curriculum and learning materials for digital competence, digital competence assessment and certification services (both inside and outside of formal education), and for digital skills measurement, as in Eurostat's Digital Skills Indicator (DSI).

Recent EU policies and research confirm the relevance of DigComp and its various implementations. For example, the Eurostat DSI shows that 54% of EU citizens have basic or above basic digital skills, while the target for 2030 under the Digital Decade Policy Programme is 80%. The European Year of Skills provide a focus to skills and a new momentum to reach the EU 2030 target of ensuring that at least 60% of adults are in training every year. Indeed, the 2022 European Declaration on Digital Rights and Principles for the Digital Decade states that everyone 'should be able to acquire all the basic and advanced digital skills they need'.

Other relevant policy programmes include the Digital Education Action Plan (particularly Action 8, updating DigComp; Action 9 on the European Digital Skills Certificate, based on DigComp; and Action 10, a Council Recommendation on digital skills provision) and policies and reforms in the area of emerging technologies such as the AI Act and other digital regulatory instruments, implications for the future of work, and funding for supporting these priorities such as the Pact for Skills and the Strategic Technologies for Europe Platform (STEP).

The purpose of this workshop session was to provide an overview of DigComp (key elements of the v2.2 in the 2022 update and rationale for the development work on DigComp taking place during 2024-2025); and to consider the development of Professional Digital Profiles (PDPs) as a specific use case of DigComp, documented in the DigComp at Work report and Implementation Guide.

Recent research (e.g. Centeno et al., 2022; Bertoni et al., 2024) has noted that the matching of digital skills demand with supply via education and training offer is challenging, in part due to different approaches to define and assess digital skills supply and demand. One solution to this is to use DigComp as a linking mechanism across supply, demand, and E&T offer. PDPs, which specify the knowledge, skills and attitudes needed to adequately perform the tasks that require the use of digital technologies in a given occupation, is a specific method to leverage this linking mechanism.

DigComp overview



DigComp framework provides a full definition of the digital competence for citizens, as *the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It is defined as a combination of knowledge, skills and attitudes and it includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking.* (Council Recommendation on Key Competences for Life-long Learning, 2018). The framework contains 5 dimensions as illustrated in Figure 7 below.

Figure 7

Overview of the dimensions of DigComp 2.2.

Source: own elaboration.

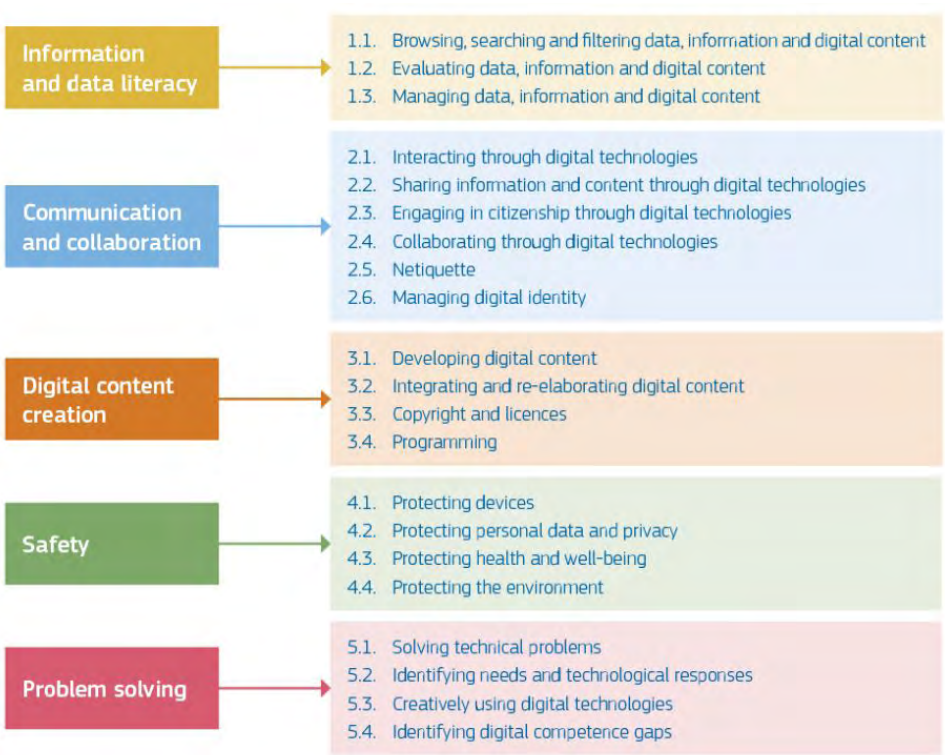
Dimension	Name	Number of components	What it is
1	Competence areas	5	Broad content areas of the framework
2	Competences	21	Sub-content areas of the framework: for example, Information and data literacy competence area has three competences
3	Proficiency levels	4 or 8	Descriptions of the level of proficiency with which competences can be executed, a combination of task complexity, autonomy and cognitive domain
4	Examples of knowledge, skills and attitudes	260	Short statements illustrating each competence - new to DigComp 2.2
5	Examples of use in education and employment	42	Examples of each competence in education and work scenarios

Figure 8 below presents the 5 competences areas and 21 competences of the DigComp Framework. Although competences combine knowledge, skills, and attitudes elements, in practice, the terms competences and skills are often used interchangeably. As can be observed from the Figure, a critical point is that digital competence (skill) under the DigComp framework is not restricted to technical or operational knowledge and includes some 'soft' skills such as communication and collaboration.

Figure 8

The DigComp framework areas and competences.

Source: own elaboration.



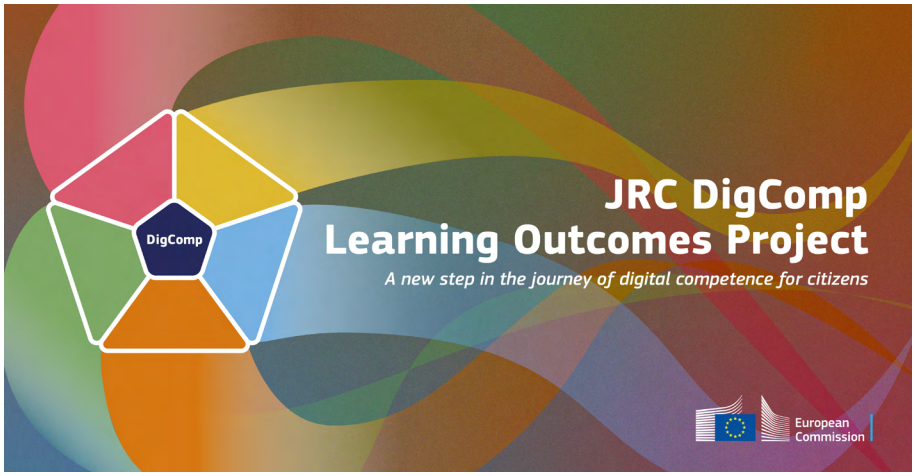
DigComp was updated in 2022 under Action 8 of the Digital Education Action plan, to include examples of knowledge, skills and attitudes (within Dimension 4 of the framework) in relation to the competences needed for the interaction with AI-based systems and the use of data, among

others. Dimension 4 is thus the major new component of the resulting DigComp 2.2, providing some 260 concrete new examples related to AI and data literacy, as well as on fact-checking online content and sources, remote/blended work/learning, digital accessibility, sustainability aspects of digital usage, and on wellbeing and safety in digital contexts.

DigComp next development stage (2024-2025): DigComp Learning outcomes project

Previous JRC research, including a JRC analysis of the structured dialogue on digital education and skills and Stakeholder consultations on a European Digital Skills Certificate (EDSC) carried out in 2023 point to a need for better operational alignment among stakeholders in the implementation of DigComp.

Also, over the past two decades, there has been a growing shift towards learning outcomes in the European Qualifications Framework (EQF) and, at a national level, learning outcomes are increasingly used in national qualifications frameworks. This shift is also supportive of a skills first approach which focuses on skills (competences) themselves, rather than how they were acquired, thereby providing opportunities and access to quality jobs to a broader population than traditional methods.



Learning outcomes are *statements of what an individual should know, understand and/or be able to do at the end of a learning process* (Council Recommendation on the EQF, 2017) and *are commonly used to define the levels of qualifications frameworks, orient curricula, set qualification standards, describe programmes and define assessment specifications. They also influence teaching methods, learning environments and assessment practices* (Cedefop, 2022, p. 15).

The DigComp learning outcomes, expected late 2025, will be designed to facilitate a voluntary, flexible, and adaptable implementation of DigComp, while at the same time enabling better alignment in more granu-

lar implementations, since a link will be made between competence and proficiency at a more granular level than previously.

The work is based on a synthesis of 50 or so stakeholders' submissions of examples of learning outcomes and related initiatives across Europe and will also include a consideration of the implications of recent and emerging technologies.

Overview of Professional Digital Profiles (PDPs)

As mentioned before, PDPs, especially those based on DigComp, specify the knowledge, skills and attitudes needed to adequately perform the tasks that require the use of digital technologies in a given occupation. Depending on the type of digital competence required, PDPs may include DigComp-related competences, but also more specialised digital competences (e.g., from the e-CF framework created for IT (Information Technology) professionals) and soft skills.

PDPs are used:

- to design digital competence (self-)assessment or certification tests;
- to design and develop training courses focused on the specific job profile;
- to assess the potential and suitability of an individual for a job;
- to evaluate work performance.

The DigComp at Work report and it accompanying Guide describe nine case examples of DigComp implementation in labour market contexts, several of which include the development of PDPs[1].In the 38 examples listed in Table T.8 of the report (which include broadly defined occupations; generic business functions; and new IT-intensive jobs), considerable diversity is evident, in (i) the extent to which DigComp proficiency levels are specified at a macro (four levels) or granular (eight levels), and (ii) the manner in which occupation-specific competences are incorporated into the PDPs (as a separate set of competences, or within the existing DigComp competence structure).

The methodology (process) for designing PDPs in these case examples[2] involves consultation and engagement with multiple stakeholders, including sector experts/professionals, human resources managers, digital competence experts, and vocational training specialists. DigComp is used as a reference vocabulary and guide to structure the analysis of the requirements. The implementation of a three-step process can use various methodologies, such as direct interviews, focus groups or surveys.

1. PDPs are addressed in the C2 ProDigeo, C3 Ikanos, C5 Compass, C6 MuSA, C7 Smartive, C8b Pathways4Employ.

2. Described in detail in the Chapter 3, section S1 of the DigComp at Work Implementation Guide

The steps entail:

- Description of main activities performed in the selected occupation and identifying critical tasks from the point of view of work output.
- Identification of activities that can be performed using digital tools. These are then mapped to DigComp competences and proficiency levels. (Not all DigComp competences are necessarily used in every profile, because the given job may not require those specific competences.)
- Consultation with field experts to describe the digital aspects of job tasks in the required level of detail, including, when appropriate, by referring to specific applications, devices and other digital products or services required to perform those tasks.

The resulting PDP can be represented at varying levels of granularity, depending on its use. For example, to provide a high-level description of the competences associated with an occupation, a tabular presentation showing each DigComp competence and required proficiency level would be adequate, while more granular lists of tasks and their links to competences and proficiency levels can be used to design and develop education and training courses.

To illustrate these different results, examples of PDPs were presented in the workshop from the projects of Ikanos[3] (in Spain), MuSA[4] in the museum sector (in Belgium, Greece, Italy and Portugal), and BIBLIO[5] for librarians (in Belgium, Bulgaria, Greece, Italy, Latvia) and from the Career Information System of the Austrian Public employment services[6].

Hands-on activity of PDP development using DigComp

For the hands-on activity, participants were split into groups and identified an occupation to work on. From there, each group selected the two most important (of the five) DigComp competence areas required for that occupation. For those two areas, the group identified and assigned the DigComp specific competences and proficiency levels to the hypothetical PDP using the template provided (a copy of the template is shown in the Annex).

Discussions

The discussions during the session indicated that in some countries with long apprenticeship experiences (e.g., in Switzerland and Germany), digital competences are already included in the curriculum, hence DigComp

3. Documented in the Annex of the DigComp at Work report.

4. Documented in the Annex of the DigComp at Work report.

5. https://www.biblio-project.eu/

6. See https://bis.ams.or.at/bis/BerufsstrukturAlphabetisch.php

might be more useful for those contexts in which the digital competences curriculum is yet to be developed.

Another example was presented on the use of DigComp to define a generic PDP for any student leaving the University to be ready to respond to the needs of the labour market (University of Aarhus, Denmark).

Participants also identified the opportunity for the DigComp learning outcomes project to take into account the labour market needs for the definition of learning outcomes. This would allow learning outcomes to play a bridging role, facilitated by the common language provided by DigComp, between the education and training and labour market sectors (as these play a key role in the supply and demand of skills respectively, and currently use different languages in what refers to digital skills).

Conclusions

The development of PDPs clearly comes with benefits. PDPs can be used to design digital competence (self-)assessment or certification tests, training courses focused on the specific job profiles, to assess the potential and suitability of an individual for a job and to evaluate work performance. Their development includes, however, some challenges. One is the time required to engage with the multiple stakeholders to establish agreement; however, a structured three-step process as described in this summary can assist in the process. Another challenge is the positioning of occupation-specific (or even technology-specific) digital competences inside or outside of the DigComp framework. For this, a pragmatic approach is suggested, as a decision on framework placement of competences depends on the occupation or occupation groups under consideration and the planned uses of the resulting PDPs.

Finally, the current development of DigComp indicative learning outcomes will provide an additional resource to support the development of PDPs and related education and training and assessment initiatives which could play a role in bridging digital skills supply and demand.

Figure 9

DigComp Profiling Template used in the workshop.

Source: own elaboration.

Digital competence profiling template			European Commission, Joint Research Centre				
			Proficiency				
Area	**Competence**	**Description** 	***Basic*** *(remembering simple tasks with guidance)*	***Intermediate*** *(understanding tasks and well-defined and non-routine problems, working independently)*	***Advanced*** *(solving or evaluating complex tasks, working independently and/or guiding others)*	***Highly specialised*** *(resolving complex problems with limited solutions and/or many interacting factors, to guide others and/or create new solutions)*	**Issues, questions, challenges:**
1: Information and data literacy	1.1: Browsing, searching and filtering data, information and digital content	To articulate information needs , to search for data, information and content in digital environments, to access them and to navigate between them. To create and update personal search strategies					
	1.2: Evaluating data and digital content	To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. To analyse, interpret and critically evaluate the data, information and digital content					
	1.3: Managing data, information and digital content	To organise, store and retrieve data, information, and content in digital environments. To organise and process them in a structured environment					
2: Communication and collaboration	2.1: Interacting through digital technologies	To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context					
	2.2: Sharing through digital technologies	To share data, information and digital content with others through appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices					
	2.3: Engaging citizenship through digital technologies	To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies.					
	2.4: Collaborating through digital technologies	To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of data, resources and knowledge					
	2.5: Netiquette	To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments					
	2.6: Managing digital identity	To create, and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.					
3: Digital content creation	3.1: Developing digital content	To create and edit digital content in different formats, to express oneself through digital means					
	3.2: Integrating and re-elaborating digital content	To modify, refine and integrate new information and content into an existing body of knowledge and resources to create new, original and relevant content and knowledge.					
	3.3: Copyright and licences	To understand how copyright and licences apply to digital information and content					
	3.4: Programming	To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or to perform a specific task.					
4: Safety	4.1: Protecting devices	To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security measures and to have a due regard to reliability and privacy.					
	4.2: Protecting personal data and privacy	To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a "Privacy policy" to inform how personal data is used.					
	4.3: Protecting health and wellbeing	To be able to avoid health risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). To be aware of digital technologies for social well-being and social inclusion.					
	4.4: Protecting the environment	To be aware of the environmental impact of digital technologies and their use.					
5: Problem solving	5.1: Solving technical problems	To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems).					
	5.2: Identifying needs and technical responses	To assess needs and to identify, evaluate, select and use digital tools and possible technological responses and to solve them. To adjust and customise digital environments to personal needs (e.g. accessibility).					
	5.3: Creatively using digital technology	To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.					
	5.4: Identifying digital competence gaps	To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution.					

5 SELFIE WBL guidelines

Speakers

- Amaia Arroyo Sagasta, University of Mondragon
- Ane Zubizarreta Pagalday, University of Mondragon

The session held at the workshop was a contrasting session for the case study of the implementation of the SELFIE WBL tool in a VET institution of the Basque Country (Spain) and based on this work, elaborate some recommendations and guidelines for the different SELFIE WBL users. The researchers considered this workshop session as a part of the case study process, a validation work.

Contextualisation of the study

In order to prepare future citizens and workers, VET institutions must integrate digital skills and competences to take advantage of the opportunities offered by digitalisation and to integrate students into the world of work (Subrahmanyam, 2022). According to Spanish VET, it has a professionalising character for learners, offering the opportunity to acquire competences linked to each specific technical qualification within a given occupational sector (Aguilar de la Rosa, 2022). According to the latest Spanish VET plan, the main mission is to create an ecosystem for economic revitalisation based on a human capital and talent strategy (Spanish Government, n.d.). To this end, one of the main elements is the integration of digitalisation in the VET system (Spanish Government, n.d.). The most recent Spanish VET law states that it is essential to use information and communication technologies in professional activities to prepare competent and professionally qualified people, since digital skills are one of the professional qualifications throughout an individual's life (Spain, 2022).

In terms of Basque Country VET, it is one of the reference models internationally, as there is a long tradition of adapting and developing VET to meet the real needs of the labour market and citizens (Basque Government, 2022). Basque VET teaching and learning has been adapted and

built over the years taking into account each of the plans developed and promoted in response to the demands of the labour market. Moreover, the objective of the latest plan is to address an updated training capable of adapting to a rapidly changing technological landscape society, noting new challenges and demands such as digital skills (Basque Government, 2022). According to this plan, the Basque Government will facilitate the adaptation of infrastructures to transform them into intelligent 5.0 VET organisations, which are forward-looking integrated educational institutions that face changes and challenges by reacting as quickly as possible and anticipating future needs. These smart organisations will include many forms of learning through advanced and disruptive technologies (Basque Government, 2022).

In Basque VET, it is possible to choose the dual option, which combines learning processes in the company and in the educational institution through the co-participation of VET institutions and companies (Basque Government, n.d.). The training carried out by students in the company must be closely related to the professional profile of the training programme (Basque Government, n.d.). This gives the opportunity to promote learning and contribute to the acquisition of job-specific skills and transferable skills, which are crucial for increasing employability. The aim of dual VET is to facilitate the integration of young people into the labour market and at the same time to promote the creation of quality employment opportunities (Basque Government, n.d.).

The case study: aims and methodology

The overall aim of this study is to analyse a case where SELFIE WBL is used to reflect on the use of technology in the training system, both in school and in company contexts.

This study has two objectives:

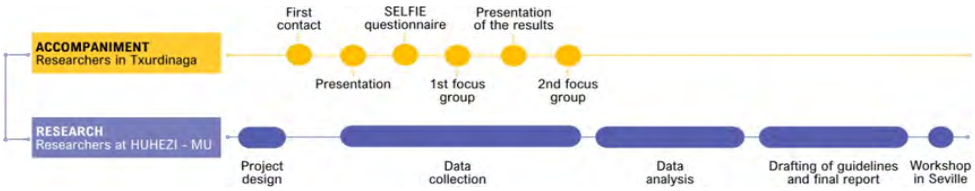
1. To identify the perceptions of all the profiles involved in the process (director, teachers, learners and in-company trainers) about the SELFIE WBL tool, the sessions conducted by experts and the process of its implementation.
2. Based on the data collected from the different profiles involved in the process, draw up guidelines for the use of the tool (including basic steps, hints, recommendations, and suggestions for a more effective use of the tool).

The case study carried out was based on a two-fold process. On the one hand, accompaniment was carried out as part of the process where we ensured the participation of all the stakeholders of the educational community of the VET institution chosen for the study. On the other hand, all the actions involved in the research process were carried out. Figure 10 reflects the entire process.

Figure 10

Process of the case study.

Source: own elaboration.



Details of the session

The main objective of the session was to share and contrast the results extracted from the case study, specifically, the guidelines developed to improve the implementation process of the SELFIE WBL tool for all the profiles involved: management team, SELFIE WBL school coordinator, teacher staff, learners and in-company trainers.

The session was organised in five sections:

1. Contextualisation of VET in the Basque Autonomous Community.
2. Explanation of the case study: information about the centre, objectives and process.
3. Explanation of the guidelines extracted from the study.
4. Dynamics to obtain contrasting feedback from the workshop participants.
5. Questions and answers.

The main task of the session was focused on the dynamics (section 4). In it, the participants were divided into five groups, one for each of the profiles of the guidelines developed. Each group had the task of analysing the guidelines and giving feedback, based on the MAMD technique (MIMO, in Spanish): Maintain (Mantener), Add (Incorporar), Modify (Modificar), and Delete (Omitir). All the groups rotated through all the profiles, to enrich the contributions of the others.

Feedback from participants

These are the outstanding contributions (omitting redundancies) extracted from the dynamics carried out, classified by profile. Below, some elements that are especially important for each profile when implementing a SELFIE WBL exercise in the VET institution, in collaboration with the training company.

Management team

- Leadership is a key factor for management, and it is of paramount importance.
- It is necessary that management is aware of all target groups' needs and tries to address them in a fair and equitable way.
- Digital strategy background knowledge is fundamental for the management team.
- It is highly recommended to explain the process's steps and the potential benefits of having onboard not only the school staff but

the in-company trainers, as key players.
- In the same line, it is very necessary to achieve more involvement and engagement of stakeholders.
- The management team should have a very proactive role in the implementation process.
- Development an open for feedback culture, to collect information from all actors.
- The management and coordination team needs support.
- Establishment of a multidisciplinary team in-house to implement the strategy.
- The elaboration of a Digital Plan is a key factor for the success.

SELFIE WBL school Coordinator

- It is important to pay attention to the diverse groups´ needs, roles, and tasks.
- Same as in the case of management, it is crucial to have previous digital strategies background knowledge and information.
- It is important to have a strategy for the design or update of the school digital plan.
- The coordinator must have clear guidelines about his/her role.
- The coordinator needs help in his/her tasks from the whole school community.
- Explain SELFIE WBL and its purpose to the teachers and learners (this could be done by teachers directly). Special note on the anonymity and confidentiality of the participation in the SLEFIE WBL exercise.

Teachers

- Teachers need clear guidance in the process, with contextual information.
    - Instructions about their role in the SELFIE WBL process.
    - Explain how to do a 'SWOT' analysis
    - How to work from the results.
    - Definition of an example for the data analysis.
- Teachers should be involved in the design of the school digital plan and its implementation.
- Teachers need to have fluent communication with the in-company trainers for the process.

Learners

- Students should be involved in the 'SWOT' analysis.
- Emphasise innovation with a bottom-up approach.
- Add next steps for learners (e.g., read action plan, contribute to implementation of the action plan…).
- Provide feedback on the results of the implementation of the students.

- Follow up involvement in action plan and monitoring.
- Explain their role and the importance for the process.
- Empowerment of learners and critical thinking.

In-company trainers

- In-company trainers need to have enough information about the process, goal, rationale, expected benefits, their role, among others.
- Management of the companies should support and encourage the instructors.
- Explore diverse ways to involve in-company trainers in the process.
- Contextualisation should create a mutual understanding.
- Next steps after the SELFIE WBL implementation are particularly important to be well-planned and designed, in advance.

Conclusions

Based on these results, the study concludes that there is a need to provide schools with a detailed overview of the process for implementing SELFIE WBL, with clear guidelines for involving all stakeholders in the school community. In this way, we will be able to contribute to the autonomy of schools to carry out the SELFIE WBL exercise.

The slot carried out in the workshop 'Digital transformation of VET' held at the JRC was key in confirming the need to differentiate the guidelines by profile. It also provided an opportunity to specify some aspects - above all, conceptual ones - and brought to the surface other needs, highlighting the development of digital leadership in the centers. This last aspect was already detected in the study and the research team is already working to address and study it.

SELFIE WBL language adaptation to company context and gaps 6

Speakers

- Daniel Wisniewski, European Federation of Education Employers
- Nina Fabe, European Federation of Education Employers

This piece of work is based on a VET Experts Group Consultation on SELFIE WBL and its reach in relation to work-based learning contexts.

This project involved developing a meticulous strategic plan to examine the language used in SELFIE Work-Based Learning (WBL). The primary objective was to assess its relevance in fostering an optimal learning environment for both learners and in-company trainers engaged in work-based learning. The focus was on refining the language of SELFIE WBL to better suit work environments. This collaborative effort entailed fine-tuning questions, identifying potential gaps in SELFIE WBL, gathering feedback from the expert group, and delivering a refined proposal. The ultimate commitment was to enhance the language's utility and clarity, thereby contributing to the ongoing improvement of work-based learning practices.

At the workshop, it was seized the opportunity to explore the potential gaps identified by experts in the project more thoroughly. The workshop participants were presented with a questionnaire concentrating on five specific topics previously identified in the work done in the current study.

The aim was to delve deeper into these gaps and gather additional insights from the experts attending the workshop in Seville.

The feedback received from various groups was thoroughly analysed and synthesised into a comprehensive summary. This summary highlighted overarching themes consistently present across all responses. By consolidating this feedback, it was possible to present a unified perspective derived from the collective input of diverse groups. The topics for discussion and potential gaps identified included:

- Inclusion of Companies in Digital Strategy and Communication with VET institutions.
- Infrastructure and Equipment (The Use of Equipment).
- Capacity of In-Company Trainers.
- Identifying Challenges in Learning Needs and Blended Learning.
- Collaboration Between VET institutions and Companies (Training Centers).

Contextual Information

The project aimed to refine the language used in SELFIE WBL by conducting a comprehensive exploration of all SELFIE WBL areas, rooted in the DigCompOrg framework. This involved evaluating aspects such as leadership, collaboration, infrastructure, continuous professional development (CPD), pedagogy, assessment practices, and student digital competence. The research adopted a qualitative approach, utilising surveys, discussions, and oral feedback to gather insights from both an expert group and VET professionals. Thematic coding and content analysis techniques were employed to analyse the data and identify key themes and language elements.

The research design adopted a qualitative approach, given the complexity of the subject matter involving language frameworks within work-based learning contexts. This approach facilitated in-depth analysis, interpretation, and the generation of rich insights. Data collection methods included familiarisation with SELFIE (WBL) frameworks, distribution of surveys to the expert group, and open questionnaires at the workshop in JRC Seville. Thematic coding and content analysis techniques were then used to analyse the qualitative data, identifying recurring themes and language elements.

The process involved collaboration with the Joint Research Center (JRC) and the selection of a diverse expert group. Experts underwent familiarisation with SELFIE WBL and contributed to refining language and addressing gaps. Feedback was collected, analysed, and consolidated into a final report, which also incorporated insights from VET experts who participated in the Digital Transformation of VET WORKSHOP 2024.

The expert group comprised professionals from various organisations across different countries, including LCETB, ANESPO, OBESSU, GO! onder-

wijs van de Vlaamse Gemeenschap, MBO Raad, and ETBI. These experts brought diverse backgrounds and perspectives to the project, ensuring a comprehensive and robust analysis of the SELFIE WBL language. Their contributions were instrumental in refining language and statements for both in-company trainers and students, enhancing the utility and clarity of the SELFIE framework for work-based learning contexts.

Main Findings

The examination of language use within Work-Based Learning revealed significant findings and adjustments aimed at improving effectiveness and clarity in communication across various domains.

In the realm of leadership, language refinement emphasised the importance of dedicated time for exploring digital technologies and clarified terminology to encompass diverse contributors to school digital strategies.

Adjustments in collaboration and networking highlighted the role of social media in facilitating communication between companies and VET institutions, alongside collaboration supporting blended learning initiatives.

Regarding infrastructure and equipment, clarity was ensured regarding digital infrastructure suitability and GDPR compliance. Emphasis was placed on up-to-date technology, adequate internet access, and encouraging students to utilise digital tools for hands-on learning.

Pedagogy and classroom implementation recognised the varying relevance of digital technologies across professions and included social media's expanding role. The statement now acknowledges diversity in digital engagement, emphasising its supportive nature in facilitating students' career readiness.

In assessment practices, digital technologies were recognised as integral components in assessment frameworks, emphasising timely feedback provision through digital means. Collaboration in assessment design between schools and external stakeholders was emphasised.

Emphasis on student digital competence included acquiring broader digital literacy skills, tailored skill development based on career paths, and mentorship-driven learning approaches within the company environment.

Additionally, potential gaps were identified, including inclusion of companies in digital strategy, capacity of in-company trainers, challenges in learning needs identification and blended learning, and collaboration between schools and companies. Suggestions included integrating health and safety references, incorporating cybersecurity inquiries, and providing specialised pedagogical training for company-based trainers.

These findings collectively highlight efforts to optimise language use in educational contexts to support professional development and enhance student learning experiences in the digital age.

The Goal and Structure of the Workshop Task

The goal at the workshop was to engage VET experts from across Europe in a discussion about the potential gaps identified in the SELFIE WBL language tool by experts in the current study, aiming to gain further clarity and understanding about them. The structure of our slot included an introduction session presenting SELFIE WBL and an overview of the work done, followed by an interactive session for questions and answers and an explanation of the World Café activity. During the World Café activity, participants engaged in discussions about five different topics or 'gaps' in the SELFIE WBL language tool, with each topic placed in a different corner of the room. Participants rotated between topics, discussing each for 10 minutes in groups of up to six people, and then reporting their findings. The topics for discussion included inclusion of companies in digital strategy, infrastructure and equipment usage, capacity of in-company trainers, identifying challenges in learning needs and blended learning, and collaboration between schools and companies. The slot concluded with a closing segment for concluding remarks and final questions.

Feedback from the participants

Inclusion of Companies in Digital Strategy and Communication with Schools

Experts highlighted the importance of cautious involvement of companies in shaping school digital strategies, emphasising considerations like data privacy and avoiding exploitation. They emphasised the need for company input facilitated through employer representatives and chambers of commerce, ensuring alignment with industry needs while prioritising societal benefits. Regarding digital communication, experts noted the absence of a dedicated platform but recognised ongoing efforts to establish one, stressing the importance of simplicity and accessibility. Additionally, they advocated for the integration of digital platforms like Moodle within company settings to bridge theoretical learning and practical application effectively.

Infrastructure and Equipment (The Use of Equipment)

Feedback from experts underscored the nuanced approach required for internet and device usage during in-company training sessions. They stressed the need for clear communication between employers and learners regarding expectations, supported by transparent guidelines and direct interaction. While usage of equipment from both the company and school exists, it remains uncommon. Experts also highlighted the importance of initiatives promoting the use of personal devices or licenses from both entities to support flexibility in learning activities. Overall, they emphasised the significance of balancing task-related activities with responsible digital behavior in a professional setting.

Capacity of In-Company Trainers

Experts highlighted the varying capacity of trainers in utilising digital tools for training purposes, influenced by factors such as the sector's nature and the trainers' age. There is a consensus that trainers' effectiveness in delivering training sessions using digital technology is limited, with skepticism about their ability to guide students in emerging technologies. Many experts advocate for specialised training programs to equip in-company trainers with the necessary skills to utilise digital tools effectively. This training should encompass both pedagogical strategies related to digital technologies and the latest industry-specific advancements to ensure trainers are adequately prepared for their roles.

Identifying Challenges in Learning Needs and Blended Learning

Feedback from experts emphasised the importance of communication between VET institutions and companies to address diverse learning needs, internet access, socio-economic factors, and specific requirements. While readiness among in-company trainers to tackle challenges associated with inclusion and diversity varies, there is a recognition of the need for support from VET institutions and potential assistance from government or regional authorities. Strategies employed to identify challenges related to blended learning include pilot programs, remote working arrangements, and initiatives like providing kits to learners. Collaboration between VET institutions and companies, including teachers' visits to companies, is seen as crucial in overcoming these challenges and ensuring an inclusive learning environment.

Collaboration Between VET institutions and Companies (Training Centers)

The consensus among experts is the importance of continuous communication and collaboration between VET institutions and companies to enhance vocational education and training. Challenges in fostering stronger ties include resource and time constraints for companies and a lack of understanding about collaboration value. However, opportunities arising from close collaboration include better-trained learners, access to advanced technology, and increased responsiveness to labor market needs. Examples of good practices in collaboration between VET institutions and companies include online platforms, Meet & Greet events, FabLab, and innovative approaches like placing classrooms within companies for theoretical learning. These practices demonstrate effective ways to bridge the gap between education and industry.

Conclusion

While there is a shared recognition of the importance of such collaboration, challenges persist, particularly in leveraging digital tools effectively,

addressing diverse learning needs, and fostering stronger ties between stakeholders.

In terms of utilising digital tools for training purposes, there is a consensus on the need for specialised training programs to equip in-company trainers with the necessary skills. This training should encompass both pedagogical strategies related to digital technologies and the latest industry-specific advancements. However, skepticism remains regarding trainers' effectiveness in delivering training sessions using digital technology and guiding students in emerging technologies.

Addressing diverse learning needs and ensuring an inclusive learning environment requires continuous communication and collaboration between VET institutions and companies. While readiness among in-company trainers varies, there is a recognition of the need for support from schools and potential assistance from government or regional authorities. Strategies employed to identify challenges related to blended learning include pilot programs, remote working arrangements, and initiatives to provide necessary resources to students.

Despite these challenges, opportunities arise from close collaboration between VET institutions and companies in VET. This collaboration leads to better-trained learners, access to advanced technology, and increased responsiveness to labor market needs. Examples of good practices in collaboration include online platforms, Meet & Greet events, and innovative approaches like placing classrooms within companies for theoretical learning.

Conclusions 7

In addition to specific conclusion for each one of the topics presented in the current report, it is possible to draw the following general conclusions from the workshop on VET digital transformation:

- A multi-stakeholder discussion and consultation is a valuable forum for refining the research findings, in this case, in relation to VET digitalisation.
- This discussion of the findings with field experts is a positive way to enhance the findings validity by fostering collaborative knowledge exchange. It is also important to support the dialogue between researchers, policymakers, and practitioners in co-creating the digital transformation of VET.
- There is a clear need for flexibility and adaptation of the use of technologies to specific needs of both learners and companies, including emerging technologies.
- One of the main challenges when dealing with the use and integration of digital technologies (especially emerging ones) is their integration in the curriculum content, goals, and learning outcomes.
- The difference among the rapid pace of technological development in industry and the slower rhythm of evolution in the education and training world was identified as a hurdle by the experts.
- One of the most important conclusions was the need to foster effective collaboration between VET institutions and companies, requiring a concerted effort from all stakeholders.
    - By addressing challenges, leveraging opportunities, and investing in training and resources, stakeholders can ensure that vocational education prepares learners for the demands of the modern workforce, contributing to economic growth and societal development.
    - It is also crucial to highlight the complexities and opportunities inherent in the collaboration between VET institutions and companies in VET.
- Regarding the learning taking place in the company context, the capacity of in-company trainers is vital. The need for specialised

training programs to equip in-company trainers with the necessary skills was one of the most important recommendations in this regard. This training should encompass both pedagogical strategies related to digital technologies and the latest industry-specific advancements.

- The differences among VET sectors in Europe and even at national level or between different VET institutions was a recurrent topic with a clear consensus of the workshop participants and also considered as one of the major challenges for taking action.
- Finally, in relation to the tool SELFIE WBL, it was a clear consensus on the importance of providing VET institutions with a detailed overview of the process for implementing SELFIE WBL, with clear guidelines for involving all stakeholders in the school community.
    - Digital leadership was mentioned as a key aspect in supporting VET institutions' digital capacity development.

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List of **abbreviations and definitions**

AEVA	Associação para a Educação e Valorização da Região de Aveiro
AI	Artificial Intelligence
ANESPO	Associação Nacional de Escolas Profissionais
AR	Augmented Reality
COVE	Centres of Vocational Excellence
CPD	Continuous Professional Development
DG EMPL	Directorate-General of Employment, Social Affairs and Inclusion
DICE	Dangerous, Impossible, Counterproductive and Expensive
DigComp	European Digital Competence Framework for Citizens
DSI	Digital Skills Indicator
E&T	Education and Training
EC	European Commission
EDSC	European Digital Skills Certificate
EFEE	European Federation of Education Employers
EfVET	European Forum of Technical and Vocational Education and Training
EQF	European Qualifications Framework
ETBI	Education and Training Boards Ireland
EU	European Union
GO!	onderwijs van de Vlaamse Gemeenschap
ICT	Information and Communication Technologies
IME-GSVEE	Small Enterprises Institute Hellenic Confederation of Professional, Craftsmen and Merchants
INTEF	Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado

IT	Information Technology
JRC	Joint Research Centre
LCETB	Learning Technology Development Officer at Further Education and Training
MAMD	Maintian, Add, Modify and Delete
MBO	Raad. Sterk onderwijs vandaag voor de beroepen van morgen
OBESSU	Organising Bureau of European School Student Unions
OCDE	Organisation for Economic Cooperation and Development
PDP	Professional Digital Profiles
PKEL	Preliminary key element from literature
PSFP	Success factor from practice
SENAI	Serviço Nacional de Aprendizagem Industrial (Brazil)
SME	Small and Medium Enterprises
STEP	Strategic technologies for Europe Platform
SWOT	Strengths, Weakness, Opportunities and Threats
TKNIKA	Basque VET Applied Research Centre
UNESCO-UNEVOC	International Centre for Technical and Vocational Education and Training
VET	Vocational Education and Training
VR	Virtual Reality
WBL	work-based learning
XR	Extended Reality

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