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Supporting the digital transformation of Vocational Education and Training

Herrero, C. and López-Cobo, M. (Editors)



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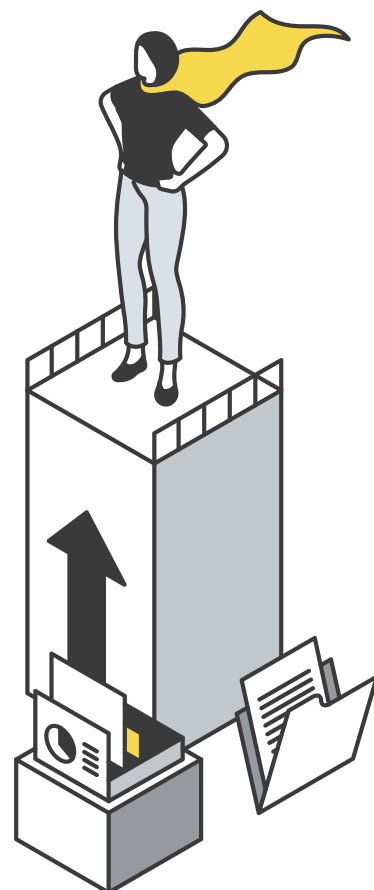
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EDITORS

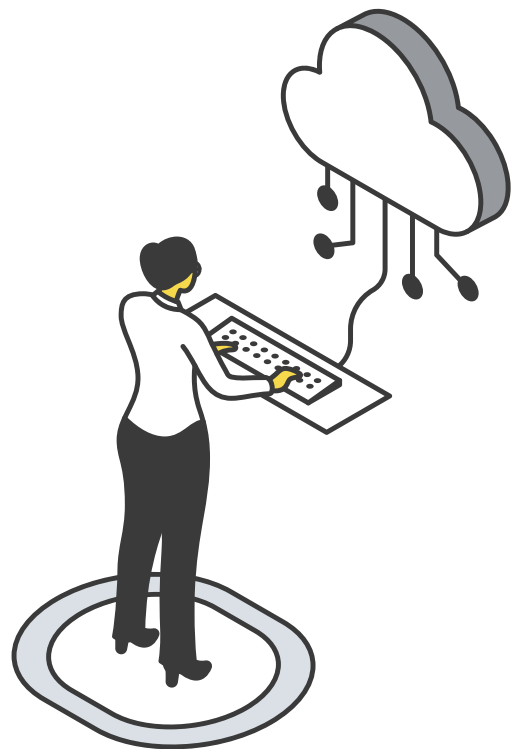
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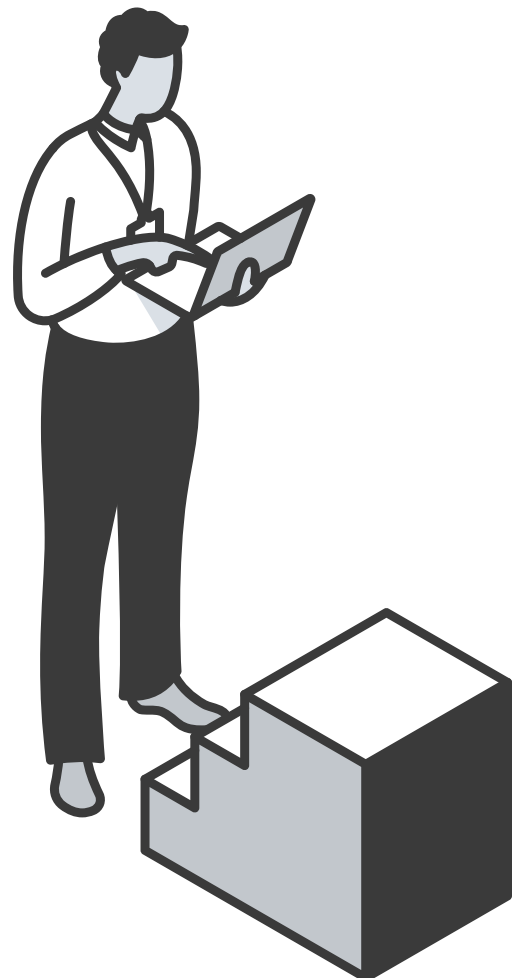
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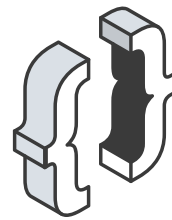
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PART I:

INTRODUCTION



Society faces a constantly changing world, with numerous challenges, from migration to climate and energy. The digital transformation is a massive one, as it is changing the way we work, learn, and participate in society. Digital technologies are transforming citizens' lives. The European Union's digital strategy '[A Europe fit for the digital age](#)' focuses on facilitating this transformation process for all EU citizens and businesses, also taking into consideration the goal of climate neutrality for Europe by 2050.

Digital technologies are affecting every aspect of our lives, from the way we communicate, shop or access public services to the way we learn or work. They are transforming jobs and the way tasks are performed, with implications for workers' performance and quality of life. Therefore, developing the digital skills of workers (and citizens) is crucial. Reskilling and upskilling are essential, and training plays a key role (Bertoni et al., 2024) in achieving the Digital Decade targets.

Rapidly evolving skills needs and growing labour and skills shortages are reshaping the labour market. Due to recent changes in the nature of work, the (digital) skills gap and mismatch are widening, making it crucial to equip current and future workers with the competences needed to meet existing and future labour market demands, which is key to competitiveness (Arregui Pabollet et al.¹).

Vocational Education and Training (hereafter, VET) has a significant role to play, in terms of bridging labour market with education but also in provision of training, reskilling, and upskilling. Skills and upskilling are fundamental for citizens and workers to realise their full potential, and succeeding in the twin transition is key to

strengthen EU's open strategic autonomy and long-term competitiveness (Matti et al., 2023).

By connecting educational institutions and professional environments, VET is a natural bridge between the world of education and the world of work (Herrero, 2023). Its digital transformation is of vital importance in many ways: on the one hand, it can ensure that European societies remain competitive and can take advantage of the opportunities that digital transformation brings. On the other hand, VET learners with the necessary digital skills can be a vector of transformation for businesses, particularly small and medium-sized enterprises (SMEs). Moreover, the use of digital technologies can enhance the educational process itself, e.g. by simulating work environments, without the associated risks or reducing the cost of some expensive and dangerous real learning environments (Tuomi et al., 2023).

VET occupies a prominent place on the European agenda. While its aim is to equip people with the appropriate skills for current and future job demands, it must be able to adapt to labour market needs and offer quality learning opportunities to achieve this goal. Therefore, VET not only facilitates access to the labour market, but also helps workers adequately meet its demands, as set out in the Council of Europe Recommendation on VET (2020), Action 4 of the European Skills Agenda.

In addition, there are several European Commission policies and initiatives related to the development of the digital transformation of the VET sector:

- [2020 European Skills Agenda](#) aims to help individuals and businesses develop more and better skills and put them to use, by
 - Strengthening sustainable competitiveness, as set out in the European Green Deal;

1. JRC Publications Repository - The changing nature of work and skills in the digital age (europa.eu) <https://publications.jrc.ec.europa.eu/repository/handle/JRC117505>



- Ensuring social fairness, putting into practice the first principle of the European Pillar of Social Rights: access to education, training, and lifelong learning for everybody, everywhere in the EU; and
- Developing resilience to respond to crises, building on the lessons learnt during the COVID-19 pandemic.
- [The European Education Area 2025](#) is an initiative to help European Union Member States work together to build more resilient and inclusive education and training systems.
- Digital Education Action Plan 2021–2027, a European Union policy initiative that sets out a common vision of high-quality, inclusive, and accessible digital education in Europe, and aims to support the adaptation of the education and training systems of Member States to the digital age.
- [The 2020 Osnabrück Declaration on VET](#) as an enabler of recovery and just transitions to digital and green economies.

Research is needed to gain knowledge and information to support the digital transformation process of the VET sector and inform future policies to ensure that EU VET systems remain competitive and deliver the best training to our citizens.

Research

The European Commission's Joint Research Centre conducted several studies in 2023 and 2024 to examine and gather evidence on key aspects affecting the digital transformation of the VET sector, and to explore the use of the SELFIE self-reflection tool—and, in particular, the work-based learning module (SELFIE WBL)—to foster a more coordinated approach between companies and VET institutions.

To achieve these two objectives, three studies were conducted, complemented by a validation workshop with experts (Herrero, 2024):

- Identification of enablers for the digital transformation of VET,
- Emerging trends and technologies in VET, and
- Small SELFIE WBL pilot projects in different VET systems through case studies.

Identification of enablers for the digital transformation of VET

The main objective of this study is to identify a set of enablers (along with challenges and potential solutions) that facilitate the digital transformation of the VET sector. The enablers are identified primarily from academic and grey literature and subsequently contrasted with existing and implemented policies or initiatives in the sector (theory vs practice). This list of enablers could support regions, countries or organisations interested in designing and implementing policies or initiatives to drive the digital transformation of the VET sector.

The methodology uses a three-phased approach: (a) Literature review: a comprehensive review of academic and grey literature; (b) Initiative analysis: initiatives are identified through an online open call and desk research, followed by an analysis facilitated based on a standardised analytical template (where possible, the information collected has been validated with representatives of the initiative); (c) Analysis and synthesis of results; and (d) Validation of results at the workshop held in March 2024.

Emerging trends and technologies in VET

The main objective of this research is to identify and analyse emerging trends and technologies that are affecting or will affect VET in the near future, to better understand current and future needs and anticipate potential policy implications. To this end, Erasmus+ projects and COVE (Centres of Vocational Excellence) initiatives are analysed.

This study uses three main data sources: (a) academic literature review supplemented with grey literature; (b) an analysis of COVE initiatives and Erasmus+ projects, focusing on the use of the latest technologies in VET as a means to exemplify digitalisation trends over the last decade and identify relevant cases; (c) consultations with Erasmus+ and COVE project partners and coordinators, through a group of experts, to provide in-depth insights and validate emerging findings; and (d) validation of preliminary results and final analysis of all collected data.

Small SELFIE WBL pilot projects in different VET systems through case studies

SELFIE for work-based learning (SELFIE WBL) is a self-reflection tool designed to support VET institutions and training companies make the most of digital technologies for training purposes.²

The main objective of this research is two-fold: on the one hand, (i) to further develop the SELFIE WBL tool through small pilot projects in different countries and regions, and (ii) to gain insight into specific VET systems to better understand the collaboration between VET provision and companies. The results of

this work aim to help policymakers better understand and potentially address companies' needs regarding the competences required for the workforce, as well as ways to better prepare learners/workers for an increasingly competitive labour market. In the context of supporting the digital transformation of VET provision, both in school-based and work-based settings, SELFIE WBL can play a pivotal role, serving as a connection between these two key actors: VET institutions and companies.

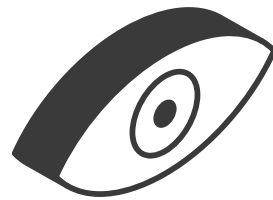
To ensure the pilot was successful and to gain relevant information and knowledge about VET systems, a selection of VET case studies was made for a more in-depth analysis of these systems. The selection of cases was carried out according to the following criteria:

- VET systems with strong and solid relations with the business sector.
- VET systems with ongoing initiatives or policies focused on supporting digital transformation.
- Despite a small number of cases, the study attempted to offer a minimal representation of different contexts and approaches. Based on this, the pilots were implemented both at national level (three cases) and regional level (one case), in three Member States and one partner country.
- In practice, ease of contact became a de facto additional criterion.

The VET systems selected for the case studies are located in Albania, Austria, Spain, and The Netherlands, and all represent good examples of effective collaboration between VET institutions and businesses.

The methodology follows a case study approach, along with interviews and focus groups with the case study participants (VET institution staff and company representatives). ■

2. [SELFIE for work-based learning - European Education Area](#)



PART II:

RESEARCH ON DIGITAL TRANSFORMATION OF THE VET SECTOR

Chapter 1.

Enabling the digital transformation of the Vocational Education and Training (VET) sector

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ABSTRACT

This chapter explores the enablers for the digital transformation of the Vocational Education and Training (VET) sector, emphasizing its role in preparing citizens for Society 5.0, a society that prioritizes human well-being while leveraging new technologies. The research identifies eight key elements crucial for achieving successful digitalization of VET programs: career education and guidance, development and use of information systems, ecological approach and collaborations, flexible accreditation mechanisms, holistic development of learners' skills, inclusion and sustainable human development, pedagogical and transformative potential of digital technologies, and teacher training for changing roles.

The study highlights how digital technologies can enhance accessibility, foster innovative teaching methods, and enable lifelong learning. It underscores the need for collaboration between VET institutions, industry, and governing bodies to ensure adequate investment and resource allocation. The chapter also discusses the importance of flexible accreditation mechanisms, such as micro-credentials, to validate skills acquired through diverse learning experiences.

Furthermore, the chapter emphasizes the incorporation of socio-emotional and transversal skills in VET curricula, alongside digital skills, to align with the evolving demands of Industry 5.0 and Society 5.0. It also calls attention to the need for sustainable practices and the inclusion of vulnerable groups in VET digitalization initiatives.

Overall, the chapter proposes a comprehensive approach to VET digital transformation, advocating for systemic collaboration, innovative teaching practices, and a focus on both technical and human-centric skills to prepare learners for future challenges and opportunities.

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1. INTRODUCTION

European citizens live in times of transition. Elements such as globalization, demographic shifts, climate change and the emergence of new cultural and technological developments, are all shaping a new reality. The job market is particularly dynamic, constantly evolving due to technological progress and we are witnessing the emergence of new occupations and, more often, the redefinition of existing ones.

While Europe works towards fully embracing Industry 4.01, characterised by automation and intelligent production incorporating emerging technologies like Artificial Intelligence (AI), Internet of Things (IoT), 3D printing, and robotics, the focus is already shifting towards Society 5.02. This next phase, Society 5.0, prioritizes human well-being and tackling social challenges, all while leveraging the potential of new technologies.

The digital transformation of Vocational Education and Training plays a crucial role in preparing citizens for Society 5.0. Firstly, because it can contribute to equipping individuals with the skills needed for a positive relationship with the technology (sustainable and human-centric). These include technical and digital skills but also socio-emotional skills. Secondly, because digital technologies have the potential to make VET more accessible, removing barriers and offering flexible learning opportunities. Thirdly, because integrating digital technologies in VET can allow new teaching and learning methods, improving the effectiveness of training programmes. Finally, because it can foster lifelong learning skills, crucial for navigating a constantly evolving job environment.

The *Council Recommendation on VET for sustainable competitiveness, social fairness and resilience (2020)*³ (hereafter, CR) aims to ensure VET is a driver for innovation and growth and prepares for the digital and green transitions and occupations in high demand, by:

- a. an offer that fosters the acquisition of entrepreneurial, digital and green skills;
- b. fostering the role of Centres of Vocational Excellence supporting European and regional innovation and smart specialisation strategies, and providing innovative services for start-ups and technology innovation for SMEs, as well as innovative reskilling solutions for workers at risk of redundancy; and,
- c. ensuring VET institutions have access to state-of-the-art infrastructure and have in place digitalisation strategies.

This chapter summarizes the key findings of a study conducted to aid in achieving the objectives of the Recommendation. The JRC commissioned this study to identify elements crucial for its successful implementation. The study was carried out between October 2023 and March 2024 and this report synthesises its main results, identifying some recommendations to Member States as a support for the implementation of the Council Recommendation on VET for sustainable competitiveness, social fairness and resilience (hereafter, CR).

The research pursued the following objectives:

- Identify the theoretical concepts and key elements for a successful digital transformation of the initial VET (iVET) sector, documented in the literature.
- Identify and analyse recent and innovative initiatives and policies related to the digital transformation of the iVET sector.

3. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020H1202%2801%29>

- Compare theoretical insights with practical development in order to identify enablers, challenges, and opportunities for designing implementation actions and policies towards the digital transformation of iVET systems in the EU.

2. METHODOLOGY

To address these objectives, the methodology employed a three-phase approach:

a. Literature review: A comprehensive review of academic and grey literature was conducted to identify key elements considered crucial for the digital transformation of VET from a theoretical perspective. Over a hundred documents were initially identified, but the selection process focused on those that specifically analysed the contribution and adaptation of (i)VET towards Society 5.0., reducing it to the limited existing research on the subject where technical reports from organisations such as the European Centre for the Development of Vocational Training (CEDEFOP), the European Training Foundation (ETF), the Organisation for Economic Cooperation and Development (OECD), the International Labour Organisation (ILO), and the European Commission are predominant.

b. Initiative Analysis: The second phase focused on identifying and analysing European initiatives with a significant impact on VET digitalization in terms of user reach. An open online call and desk research were used to identify 19 initiatives with varying scopes.⁴ It is important to note that the selection was not intended to provide a quantitatively representative sample of the European landscape. A common template was used to analyse the initiatives, capturing details such as basic information, rationale, goals, barriers, success factors, and key contributions. Whenever possible, the collected information was validated with the initiative representatives, ensuring the inclusion of practitioner’s voices. A list of the initiatives is shown in Figure 1. More information can be found in the annexes.

4. They have goals such as: a) modernisation of material and organisational aspects (modernising skills recognition systems, updating curricula, modernising materials, modernising facilities and fostering the use of emerging technologies...), development of VET professionals (teacher training, teacher digital skills, sharing good practices, learning resources and scenarios, MOOCs...), development of learning skills (technical skills (AI, industry 4.0), digital skills, socio-emotional skills...) and orchestration of digitalisation (regional or national policies, initiatives at school level promoting n strategic approach).

FIGURE 1.
List of initiatives analysed.

Number	Name of the initiative
1	6 th Vocational Education and Training Basque Plan
2	Resources for VET digitisation (Dualiza)
3	Scuola Centrale Formazione
4	Improve Digital Competences of VET Teachers and Trainers (IDC-VET)
5	The AI-powered Next Generation of VET
6	Skills OVATE

Number	Name of the initiative
7	THEWAYUP!
8	2022-24 Strategic Plan for Vocational Education and Training, Lifelong Learning, and Youth
9	Pathfinder service (Innnove Rajaleidja)
10	KYVYT.FI
11	Digitalization of national TVET and skills systems: harnessing technology to support LLL
12	E-VET4AI
13	TKNIKA
14	ADDUPT
15	ODZNAKAPLUS
16	Learning factories in VET institutions (Fagskolen Innlandet case)
17	SELFIE & SELFIE WBL
18	VET teachers embracing digital disruption (VET-TEDD)
19	GROOVE project- Digital transformation of the VET sector

Source: own elaboration.

c. Synthesis: The third phase involved verifying if the key elements identified in the literature review were present within the analysed initiatives. This allowed for the identification of elements with potential for further promotion and the development of conclusions based on the entire analytical process. Finally, the results were validated in an expert workshop held in March 2024⁵ (Herrero, 24).

3. RESULTS

Two major, interrelated trends emerged from the study: digital disruption and sustainability concerns. These trends are driving the need for a significant upgrade in individuals' competencies. This goes beyond adapting to changing professions; it also encompasses the skills needed to thrive as citizens, shaping their own life paths. VET programs can contribute to address these needs but achieving this requires radical innovation that includes digital transformation and a new concept of curriculum. Throughout this section, some examples will be provided to explain and illustrate the key elements.

In this context, in the literature review phase (and further refinement during the validation workshop) the study identified eight key elements or enablers of digital transformation of VET. They are shown in Figure 2 (below), in alphabetical order. We describe below each of the elements and propose related recommendations.

5. Workshop participants agreed with the key VET digital transformation elements (initially 13), however, they signalled some overlap between some of them. Subsequently, the research team refined the elements to an 8-element list (the one used in this report). Annex 1, however, retains the original list of 13 as it was used for description of initiatives and for providing more granular details of each of them to interested readers.

FIGURE 2.

Eight key elements for a successful digital transformation of VET.



Source: own elaboration.

a. Career education and guidance⁶

The use of digital technologies in career education and guidance has taken three

6. Career education is defined as 'Programmes and activities of learning to help people to develop the skills necessary to manage their career and life pathway. These include accessing and making effective use of career information and guidance' (European Lifelong Guidance Policy Network, 2015, 14). Guidance can be defined as 'A range of activities that enable citizens of any age, and at any point in their lives, to identify their capacities, competences and interests; to make meaningful educational, training and occupational decisions; and to manage their individual life paths in learning, work and other settings in which these capacities and competences are learned and/or used' (European Lifelong Guidance Policy Network, 2015, 14).

different forms (Bakke and Hooley, 2023; Zelloth et al., 2020): 1) as a tool that supplements other tools used in career services; 2) as an alternative that replaces other career services elements; and, 3) as an agent of change that alters the design of career education and VET. Digital technologies can be used as an additional or alternative tool for career guidance. Digital disruption and its consequences call for their use as an agent of social change. That way, the use of Information and Communication Technologies (ICT) is considered as a part of society and a form of political practice. In this sense, technologies may create tools for the redistribution of power (Castells, 2015, Hooley

& Stauton, 2020). The use of ICT in career guidance has adopted different functions (European Lifelong Guidance Policy Network, 2015): a) informing: to help users to access and use careers' information; b) experiencing: to help users learn from virtual experiences; c) constructing: to help users to better understand themselves and their situation; d) communicating: to connect with networks of support. An informative approach to guidance prevails (a), to help make timely decisions (see Box 1).

BOX 1.

THEWAYUP! (UNITED KINGDOM, ANNEX 1 FICHE 7)

This initiative is a game that simulates different graduate career paths to help learners make more informed choices about their future. It also aims to help learners from disadvantaged backgrounds set aspirational educational and career goals to increase their chances of achieving them. Using real-world data, it gamifies important life decisions, including qualification levels, apprenticeships, and university course choices. Based on these decisions, the game then simulates the occupations available to players and the first five years of their graduate lives. It uses data from 14 career and educational datasets, and up-to-date salary and occupation information from 10 different datasets. Players decide what is important to them: earnings, happiness, work-life balance, or education across 10 years of their life. The tool is appropriate both for autonomous and group use and for schools and teachers.

Career practitioners, when considering individual career and digital skills, must consider and analyse factors related to 'why, what and how'

about the digital skills use and purpose. That means (Zelloth et al., 2020) to develop not a digital, but an educational approach that uses digital opportunities with an ontological basis (in other words, the sense of using digital technologies).

Watts (2010) emphasised the potential of ICT in career guidance as an agent of change. Career guidance is a process of co-construction of a new knowledge, is critical and committed to social justice (Kettunen, 2017; Kettunen et al., 2015). Digital technologies can be used to empower people to make better choices and construct their own trajectories (Barnes et al., 2020). From this critical perspective, it is recognised that ICT are not neutral tools, so, their election has political and personal implications (Hooley & Stauton, 2020).

Despite the full potential of ICT in career guidance, there are still many challenges that need to be addressed (Kettunen & Sampson, 2019): a) inadequate access to ICT; b) inadequate access to information; c) inadequate skills and competences; d) inadequate integration of ICT. This is in conjunction with the insecurity that practitioners face when using ICT in career guidance processes (Moore & Czerwinska, 2019). This may be one of the reasons why, according to research (Hirschi, 2018; Whiston et al., 2017), there has not yet been a widespread and adequate use of ICT in career guidance, or it is often limited to a basic level of guidance (information).

Recommendations for Member States

In line with Recommendation 16 of the CR, which states Clear and user-friendly information on learning and career opportunities, and validation opportunities, in the entire EU is ensured through high quality lifelong learning and career guidance services, making full use of Europass and other digital services,



R6. The study reveals the importance of:

- Digital technologies provide opportunities to extend the Career guidance's role beyond information provision to a learning process, which can include experimentation through virtual experiences, development of self-awareness, communication with support networks and self-empowerment to construct careers both individually and collectively.
- Digital technologies as a lever for career guidance processes supported by more and up-to-date data and information.
- Training career guidance practitioners on digital skills and on the opportunities that digital technologies bring to their profession for a more effective service to their users.

b. Development and use of information systems

Data can be used as a tool for improving VET systems and institutions, and digital technologies can play a significant role in their use. Beyond the use of data to improve pedagogy (see point c) there are several ways on how the interconnection between data and technology can be beneficial in VET.

Labour market data can contribute to curricula adaptation (European Commission, 2020) and programs that equip graduates with in-demand skills. Technology can be used for better and more timely anticipation of market skills by exploiting its potential to collect and analyse big data (ILO, 2021). The EU has established high quality macro information systems such as CEDEFOP's OVATE (CEDEFOP, 2019) that uses big data and AI for extracting information (see box 2), but there are other national tools as the Estonian

government OSKA forecast initiative⁷ offering insights from qualitative interviews and statistical data in an online tool. However, our study has identified that the use of this type of skills intelligence currently seems to be more oriented towards career guidance for individuals and linking employees with industry (e.g. Amsterdam House of Skills)⁸ rather than informing curriculum updates within iVET institutions.

BOX 2.

DIGITAL TECHNOLOGIES FOR SKILLS INTELLIGENCE: CEDEFOP SKILLS OVATE (EUROPE, ANNEX 1 FICHE 6)

CEDEFOP has developed a labour intelligence system at EU level that harnesses the potential of recent technologies. CEDEFOP's Skills OVATE (<https://www.CEDEFOP.europa.eu/en/tools/skills-online-vacancies>) aims to gather, analyse and present real time data about the skills needed by employers exploiting the information contained in EU Online Job Advertisements (OJAs). New developments in big data and artificial intelligence are used for this aim. This real-time data can be helpful to bridge curriculum and guidance to labour market needs, but also to adapt curricula of VET systems or identify emerging skills. Using dashboards, the tool offers real-time information about online job markets, skills insights, occupation insights, sector insights and geographical insights at various levels (including regional). The tool aims to complement other Cedefop's sources of labour intelligence such as Skills intelligence, European skills forecast, the European skills index, and the European skills and jobs survey.

7. <https://oska.kutsekoda.ee/en/>

8. <https://www.houseofskillsregioamsterdam.nl>

Data based on individual and organisational self-reflection is another valuable source for VET institutions' improvement. (ETF, 2023). VET (including companies which provide training) have a crucial role in the digital transition both for teaching digital skills as well as providing digital tools for learners and workers (Herrero, 2023). Digital technologies can be used to collect, analyse, synthesise, and foster the use of collective self-reflection exercises at school level. Analysing data from such tools can also help VET providers to identify strengths and weakness in the school's digital capacity in different areas. It can help to prioritise actions and investments to develop a comprehensive digital transformation strategy that uses data for continuous improvement. Many analysed initiatives leverage self-reflection models to drive digital transformation in VET institutions. These initiatives often follow the European Commission's SELFIE, SELFIE WBL and SELFIE4TEACHERS tools model, which provide an approach to self-reflection about digitalisation in VET institutions by school leaders, teachers and learners, including in work-based learning (WBL) scenarios (see fiche 17 and Costa et al., 2021, Hippe et al., 2021, and Redecker, 2017). As McCoshan et al. (2023) stated, there is a need for understanding innovation, skills, and VET's role in supporting innovation and therefore, a need for a self-reflection process to improve these connections. The goal is to extend or complement these tools as seen in the e-VET4Ai initiative's Self-Awareness Tool (SAT) that develops Industry 4.0-aligned digital skills for trainers in the mechanical sector through a SAT tool focused on big data, AI, machine learning, digital twin technology,⁹ and augmented

9. Digital twins are virtual replicas of physical objects or systems that simulate their behaviour and performance. They try to mirror reality and are useful for simulations and simulation interventions and changes in the system without altering the real one.

reality. Similarly, the IDC-VET project created a dedicated self-reflection tool for teachers based on DigCompEdu to cater to the metalworking and machinery production, social care, and hospitality sectors.

Finally, it is important to note that, despite the potential benefits of data sharing for mutual learning, there is a gap in public information about initiatives aiming the digitalisation of VET. Based on the analysis of initiatives performed, it is possible to say that this lack of information extends beyond basic program descriptions, including information on the evaluation and impact of pilot programs or experiments, which is often limited. This is an obstacle to the exchange of knowledge and the transferability or scalability of good practices. Additionally, it may reflect the inexistence of sound evaluations or clear measurable objectives in the design of the initiatives, what can hinder to follow a logic of monitoring and continuous improvement. Sometimes, it could also be related to the proper design of the initiative and the lack of planning in this sense.

Recommendations for Member States

In line with Recommendation 22 of the CR, which fosters Support sustainable partnerships for the governance of vocational education and training, in accordance with national context and, where relevant, through public-private partnerships involving social partners and all relevant stakeholders,

R7. The study reveals that this process can be supported by:

- Promoting the use of (local and global) information intelligence systems on labour market skills demand for curriculum revision and alignment with industry needs.
- Promoting a culture of sharing information and evaluation of initiatives and policies related to transformation of VET.

- Encouraging the implementation of self-reflection exercises by VET institutions and providing guidance on how to translate the results into actionable plans for digital transformation.

c. Ecological approach and collaborations¹⁰

Collaboration and networking are identified as critical areas for schools functioning (Muijs et al., 2010) and for its digitalisation (Costa et al., 2021). Our research shows that there is a plethora of local initiatives aimed at digital transformation of VET. However, a lack of coordination and collaboration can hinder their overall impact. Fragmentation can affect to the adoption of good practices and the efficient allocation of resources and is something to be avoided for a successful digital transformation of VET.

Unlike in other levels of education, the digitalisation of VET requires significant investment in Industry 4.0 technologies. In addition, specialized learning environments such as fablabs, digital twin simulations or learning factories require significant additional resources (Walter-Herrmann, 2013). This requires a systemic approach that prioritises collaboration between key stakeholders at multiple levels to make a collaborative investment (e.g. between policy makers, industry, and schools). Industry can be a stakeholder interested in investing on the digital transformation of VET institutions, as this level of education is key to bridging the skills gap and ensuring a stream of graduates with industry-relevant skills and knowledge about cutting-edge technologies (Grencikova et al., 2021; Pfeiffer, 2015). School-networks can also be a way to share the costs of digitalisation.

10. We define ecological approach as a holistic and systemic approach that focus on interconnectedness and collaboration of the stakeholders, giving importance to the contextualization and sustainability of the initiatives in order to maximise their efficacy and efficiency.

VET institutions, industry partners and regional and national governing bodies need to work together to ensure not only an adequate investment but also the efficient allocation of resources (avoiding duplication) and the widespread adoption of good practices (See box 3). They must also ensure that successful initiatives are maintained 'alive' and scaled up. For this collaboration to happen, leadership plays a key role, and this is true also in systems with dual models, that combine classroom learning with on-the-job training at a company, where this collaboration is highly recommended (Emmenegger, Graf & Trampusch 2019) overcoming financial and technological limitations.

School principals should lead digital transformation by fostering a culture of innovation, establishing dedicated transformation plans and building partnerships with other stakeholders. Regional governments have a vital role to play in promoting and identifying good practices, and in encouraging the creation of VET institutions' networks and strong public-private alliances and collaborations between VET institutions and industry (Sauli, 2021). In fact, industry can participate actively providing funding, expertise, and access to the latest technologies, avoiding duplication of efforts, and identifying synergies (see annex 1 fiche 1: 6th Vocational Education and Training Basque Plan for an example of a comprehensive plan from a regional organisation and fiche 8 for an example of a national plan). While local and regional level are key to cooperation efforts, it can also be promoted at national or transnational level. The EU initiative of Centres of Vocational Excellence (CoVEs)¹¹ can be considered a good practice in the sector as they promote the creation of a

11. <https://erasmus-plus.ec.europa.eu/programme-guide/part-b/key-action-2/centres-vocational-excellence>

collaborative ecosystem of innovation in a local context, including international collaborative networks and social inclusion dimension.¹²

BOX 3.

LEARNING FACTORIES IN VET INSTITUTIONS (FAGSKOLEN INNLANDET CASE, NORWAY, ANNEX 1 FICHE 16)

A learning factory replicates real-world production, offering learners a hands-on experience. According to Abele (2016), these environments feature authentic, multi-station processes that combine technical and organisational aspects. The setting is changeable, resembling a real value chain and adapting to specific training goals. Learners produce a physical product, solidifying their understanding through hands-on experience. The didactical approach integrates formal, informal, and non-formal methods, with trainees actively involved.

Fagskolen Innlandet, a Norwegian vocational school, exemplifies this concept. Collaborating with local industry, they built learning factories equipped with modern technology within a local industrial park (Raufoss). These controlled environments mirror real production facilities and incorporate Industry 4.0 technologies. The factories utilise adaptable 'cases' for targeted training. This industry-education collaboration, fostered by Fagskolen Innlandet's partnership with the Manufacturing Technology Norwegian

Catapult Centre (MTNC), creates a cost-effective model. VET institutions gain access to innovative resources, while learners receive practical experience with Industry 4.0 technologies and industry secures a future flow of prepared workforce. This partnership also facilitates curriculum development, ensuring programs remain up to date regarding industry.

Beyond establishing collaborative structures, the representatives of the initiatives included in this study tend to agree that it is also important to promote effective communication strategies and raise awareness of what different initiatives are doing to achieve digital transformation in VET. In this sense, the development of multi-stakeholder outreach plans that target other VET institutions, industry, policy makers and learners and families is important. However, they also point out that it is important to have specific industry sectors in mind when designing the initiatives as despite there are common issues, one-fit-model does not work for all VET sectors.

Recommendations for Member States

In line with the CR, which recommends that, Member States take actions to implement this policy at national level, together with social partners and other relevant stakeholders,

R8. The study reveals the need for an:

- Ecological approach for the digital transformation initiatives; i.e. to develop a systemic approach for interconnection and collaboration of all potential stakeholders, with a focus on contextualisation, scalability, and sustainability of the initiatives to maximise their impact.

12. It means the inclusion of 'actions to address diversity and promote shared values, equality, including gender equality, and non-discrimination and social inclusion, including for people with special needs/fewer opportunities' (see <https://erasmus-plus.ec.europa.eu/programme-guide/part-b/key-action-2/centres-vocational-excellence>)

d. Flexible accreditation mechanisms

Traditionally, accreditation has signalled completion of formal education programs at recognized institutions, demonstrating an individual's competences in a specific area. However, these 'formal' qualifications are no longer the only way to demonstrate skills. Industry and society have started to recognise the value of skills, regardless of how and where these are acquired by individuals (Kumar & George, 2021) and it is becoming important that individuals can demonstrate these acquired skills (Council of the European Union, 2012). Flexible accreditation mechanisms are emerging to validate knowledge, skills and competences regardless of acquisition method and VET institutions can consider using them.

Flexible accreditation mechanisms can be particularly useful for non-traditional learners with complex trajectories (Council of the European Union, 2012). Individuals who have acquired skills through on-the-job experience, online courses, or self-directed learning often lack formal credentials that accurately reflect these skills. Flexible accreditation mechanisms allow these skills to be recognised and validated, providing these individuals with a way of demonstrating their competences and facilitating their integration in the labour market.

Micro-credentials¹³ are a common way to implement flexibility in accreditation

13. According to the European Commission Proposal for a Council Recommendation on a European approach to micro-credentials for lifelong learning and employability (2022) micro-credentials 'could help certify the outcomes of small, tailored learning experiences. They make possible the targeted, flexible acquisition of knowledge, skills and competences to meet new and emerging needs in society and the labour market and make it possible for individuals to fill the skill gaps they need to succeed in a fast-changing environment, while not replacing traditional qualifications'.

mechanisms. Digital technologies can facilitate the operationalisation of micro-credentials by making it easier to manage and store the detailed data of the skills acquired. Micro-credentials can also make these skills more traceable and easier to demonstrate (e.g. using online portfolios or digital badges), and in a flexible way that aligns with a competence-based education (Clements et al., 2020; Lahn, & Nore, 2018).

Widespread adoption of digital flexible accreditation mechanisms (e.g. micro-credentials) at system level is crucial to ensure its consistency, transparency, fairness, and credibility (European Commission, 2020). It would promote its recognition by industry. It would also prevent the creation of a two-tier system where some official learning paths and certificates are more valued by the society and industry than others would. The European Commission suggests an approach towards the adoption and use of micro-credentials¹⁴ (European Commission, 2022). It is also important that online flexible accreditation mechanisms are scaled to a wide range of skills, as they are now usually more focused on digital skills (e.g. the European Commission is conducting a feasibility study on the recognition of digital skills across Europe).

Online micro-credentials and digital badges are identified by employers as complementary to,

14. Micro-credentials could help certify the outcomes of small, tailored learning experiences. They make possible the targeted, flexible acquisition of knowledge, skills and competences to meet new and emerging needs in society and the labour market and make it possible for individuals to fill the skill gaps they need to succeed in a fast-changing environment, while not replacing traditional qualifications. They can, where appropriate, complement existing qualifications, providing added value while not undermining the core principle of full degree programmes in initial education and training. Micro-credentials could be designed and issued by a variety of providers in different learning settings (formal, non-formal and informal learning settings) (European Commission, 2022)

rather than substitute for, formal certificates (Kato et al., 2020). iVET institutions can leverage these versatile accreditation mechanisms to personalize learners' learning pathways and make better decisions about prior learning recognition. On the other hand, if iVET institutions start to use them, employers could gain a better understanding of the skills of candidates in a more granular and up to date way (Brown et al., 2021). Nevertheless, based on the analysis done in this work, digital badges and micro-credentials initiatives in the EU tend to be more focused on adult learners and there is not so much evidence of their use by iVET institutions.

BOX 4.

MICROCREDENTIALS - PILOTING A NEW SOLUTION TO SUPPORT LIFELONG LEARNING AND ODZNAKA+ (BADGE+) APPLICATION (POLAND, ANNEX 1 FICHE 15)

Aligned with the European Council's approach on micro-credentials, the Educational Research Institute (IBE) is testing the value of micro-credentials in Poland (<https://odznakaplus.ibe.edu.pl/>). The project aims to set standards for micro-credentials, pilot their use for skills validation, developing a badges management app (Odznaka+), and promoting micro-credentials for adult upskilling. Targeting a wide audience, the initiative involves formal and non-formal education providers, as well as individuals seeking to enhance their skillsets. In its first stage, it focuses on ICT skills due to high demand. The Odznaka+ application, based on Open Badges standards, is being piloted for issuing and managing digital badges representing micro-credentials. Funded by the public sector, the initiative is ongoing

until September 2026 and has a national coverage. It is important to note that in its initial phase this is a program for adults and is not yet implemented within vocational education and training schools, although responsible of the initiative state that future will cover VET institutions.

Finally, block-chain technology¹⁵ can also be used as a catalyst for transformation of accreditation systems (Grech & Camilleri, 2017; Yang & Yang, 2024). As this technology offers a secure and reliable platform for storing data, it can be used for issuing diplomas, manage records, but also make alternative and flexible accreditation mechanisms more secure and verifiable. It can create a transparent record of acquired skills, controlled by the user. Moreover, due to its decentralised nature, it can also facilitate the collaboration between employers, institutions, learners... regarding alternative skills accreditation and micro-credentials.

Recommendations for Member States

In line with recommendation 29 of the CR, which states Exploring the concept and use of micro-credentials, including in VET, together with Member States and relevant stakeholders,

R5. The study reveals:

- The opportunities offered by micro-credentials and other flexible accreditation mechanisms as a complement to VET qualifications for specific skills

15. As defined by Grech & Camilleri (2017) blockchain technology acts like a shared record book for a community. Each member keeps a copy, and everyone needs to agree on updates. This record can hold any digital information, from transactions to information on skills. Entries are permanent, transparent, and searchable. Updates are added as new blocks to a chain. A protocol of rules establish how changes are made and verified. In essence, cryptography replaces a central authority. As everyone on the blockchain can use calculations to ensure the integrity of the entire systems.

demanding by the labour market in terms of agility, flexibility, and specificity. This complementary approach appears as an effective solution to accredit emerging skills not yet included in formal VET programs.

e. Holistic development of learners' skills

The development of technical and digital skills is a key element identified and is present in several initiatives. Digital skills are essential in the development of almost all jobs and occupations, and Vocational Education and Training has a significant role in training the future workforce (CEDEFOP, 2023). At present, digital competence can be defined as the knowledge, skills, and attitudes for the safe, critical, and responsible use of digital technologies for learning, at work and for participation in society (European Union, 2018; Vuorikari et al. 2022). Despite the increasing digitisation of jobs, there are widespread digital skills shortages in the context of European labour markets. Digital skills have a clear impact on workers' employability. As a result, there is a mismatch between labour supply and demand. The importance of these skills has been highlighted in reports such as *The Future of Skills: Employment in 2030* (Bakhshi et al., 2017) and especially in the *EU Skills Agenda* (European Commission, 2020). This Agenda places particular emphasis on the importance of acquiring digital skills, which are integrated as an essential aspect of Action 6 (Skills to support the twin transitions). In this sense, people need digital skills across all areas of economy and society. Nevertheless, there are some important gaps between people's digital skills and the industry's demand of specific types of digital skill or the characteristics of an important number of new jobs. Therefore, the workforce needs to increase their level of digital skills.

However, digital skills training in VET is still modest (Pouliakas et al., 2022). Moreover, precisely vulnerable groups do not receive it, so the EU suffers from a digital skills gap, which implies significant risks of unemployment, poverty, and social exclusion (European Commission, 2020). Priority target groups for digital skills policy action include young people with low-level formal education and NEETs, older individuals, those with low and medium-level formal education, individuals unemployed and inactive, nationals from non-EU countries, individuals living in rural areas and individuals employed in semi-skilled and low-skilled occupations (Centeno et al., 2022). There is also a gap between the use of technology for basic personal and leisure use and for training or work (Álvarez-Flores & Núñez-Gómez, 2019). Gaps in relation to the development of digital competence in the context of VET are highlighted by the lack of scientific literature on the subject. This is shown by the results of the literature review recently carried out by Aguilar de la Rosa (2022), in contrast to what has been generated at other educational levels.

Collaboration between industry and VET institutions could be promoted as this can facilitate the acquisition of specific skills required by industry. Thus, the OECD (2017) refers to the creation of 'learning organisations' with strong educational leadership and openness to partnerships (with families, communities, cultural institutions, businesses, and other schools) as key elements for putting the principles of innovation in education into practice, so that education can respond to the transformation of society. The collaboration of the social partners is essential in identifying training needs to develop skills intelligence (European Commission, 2020).

On top of digital skills, learners need also to develop other key competences to fully

contribute to a sustainable society in the context of digital transformation. The development of more human aspects such as transversal and socioemotional skills is identified as a key element for the transition to society 5.0. Reports by the European Commission (2020, 2021) or CEDEFOP (2022) advocate a new paradigm in which the person is not replaced by technology, but rather technology is considered a means to achieve social objectives that put the person at the centre (promoting talents, attending to empowerment and personal well-being), with resilience (flexible and adaptable technologies) and caring for sustainability (respect for the planet and social justice). A large part of the current 'know' and 'know-how' required of professionals is being required to complete their 'know how to be' and 'know how to live together' (Echeverría & Martínez-Clares, 2018, 7). These competences include (European Commission, 2020, 2022; Wagner, 2014): creativity, curiosity, imagination, critical thinking, creative problem-solving, effective communication skills, information analysis, agility, adaptability, learning to learn, entrepreneurial skills, collaboration ability, taking initiative, leadership, working together, and people management skills. There is evidence that developing digital competence empowers individuals, helping them to develop self-confidence, self-efficacy, transversal skills (social networking, collaboration, problem solving, language skills) and eLearning skills, all useful for employability. The acquisition of ICT skills also fosters further skills development, motivating learners to pursue other types of education. (Green et al., 2013).

There are VET related initiatives proposing research and development (R&D) processes at the service of comprehensive vocational training in which the set of competences mentioned

above are developed (see Box 5). In this kind of initiatives, innovation plays a key role in supporting the transformation of the VET sector in a systemic and comprehensive approach.

BOX 5.

TKNIKA. (SPAIN, ANNEX 1 FICHE 13)

The main goal of this initiative is to make progress in new learning settings and processes, and to reduce the skill gap from when an idea or technology comes about until society can take advantage of it. The future that TKNIKA aspires to in the short- and mid-term is to be *THE* European leader in the application of advanced practices in capillary transfer of knowledge to the business network, through vocational educational training schools. To this end, TKNIKA plays the role of an organization that researches and innovates in different fields for the Euskadi VET system. It intends to act as a driving element to facilitate and boost innovation developed by VET institutions. Its activity's expected impact is focused on creating innovative knowledge that provides added value to the development of skills and knowledge (technical and cross-cutting) for teachers at schools in the Euskadi VET system, in order to be transferred through its own to different service recipients (learners, companies, active workers, the unemployed, society, etc.).

Recommendations for Member States

In line with Recommendation 1 to Member States of the CR, which states that Vocational education and training programmes offer a balanced mix of vocational including technical skills well aligned to all economic cycles, evolving jobs and working methods and key competences, including solid basic skills, digital,

transversal, green and other life skills which provide strong foundations for resilience, lifelong learning, lifelong employability, social inclusion, active citizenship and personal development;

R1. The study reveals that:

- There is a need to incorporate socioemotional skills related to technology in VET programs, with a more human-centred approach (including resilience and caring for sustainability), in alignment with Industry 5.0 and Society 5.0, in which humans should be at the centre of the technological transformation.
- The importance of digital skills development as a priority in VET programs to support the development of transversal/soft skills.

In line with Recommendation 22 to Member States of the CR, which fosters sustainable partnerships for the governance of vocational education and training, in accordance with national context and, where relevant, through public-private partnerships;

R2. The study reveals:

- The need for a structured institutional cooperation process between VET public governance and industry representatives to support the continuous update of the VET offer to better address the current and future needs of industry.

f. Inclusion and sustainability

Inclusion and sustainability are often neglected in VET digitalization initiatives. These initiatives rarely consider job displacement, unethical work practices, environmental impacts, or ethical concerns around technology use. This is true even though VET is considered as a key element for inclusion and sustainability (European Commission, 2020). Digitalisation

initiatives need to contribute to the twin (digital and green) transition considering the environmental impact of the production and use of technologies.

BOX 6.

ADDUPT (WESTERN BALKANS, ANNEX 1 FICHE 14)

This initiative aims to strengthen VET by building qualification systems, improving learning quality, and continuously developing VET teachers and trainers, focusing on capacity building in West Balkan countries to enhance vocational education's effectiveness. They offer: Assessment of the main needs and job requirements in the green sector; workshops with experts of the green and VET sector that will review, and assess the results of the need analysis, ensuring maximum level of reliability; development and implementation of an integrated Capacity Building Framework for VET to support them shifting toward twin transition and developing digital microlearning resources; VET action plans and digital microlearning resources answering the identified needs of the green sector.

In a context of transition to Industry and society 5.0, the integration of digital technologies in VET must consider that people collaborate with technology, rather than being replaced by it (CEDEFOP, 2022). This approach is, in part, aligned with the concept of decent work¹⁶

16. 'Decent work sums up the aspirations of people in their working lives. It involves opportunities for work that is productive and delivers a fair income, security in the workplace and social protection for all, better prospects for personal development and social integration, freedom for people to express their concerns, organize and participate in the decisions that affect their lives and equality of opportunity and treatment for all women and men' (ILO, 1999: <https://www.ilo.org/topics/decent-work>)

(Blustein et al., 2016, 2017, 2019; ILO, 1999; Ribeiro, 2020) and sustainable employability¹⁷ (Fleuren et al., 2016, 2020; van der Klink et al., 2016), two elements that should be included in VET curriculum (Romero-Rodríguez et al., 2024).

Digital technologies hold immense potential to promote inclusion for traditionally vulnerable groups (i.e. Not in Education Employment or Training -NEETs-, early leavers from education and training, migrants, learners with disabilities, etc.). The positive effects of developing digital skills have been demonstrated. It is important in order that the most vulnerable learners can use technology in a safe and equitable context (CEDEFOP, 2022). Technology can also be used to support the different learning paces of learners and thus prevent early school leaving (Psifidou and Treves, 2022).

In relation to gender gap (i.e. gender imbalance in STEM professions, influence of gender on how learners engage with digital tools, etc.), while crucial, few initiatives actively address it from the outset. Specific VET programs can contribute to innovate in areas and senior jobs in which women are under-represented by supporting the training of women to tackle this imbalance (European Commission, 2020). There is, however, a lack of literature and research in relation to the gender gap in VET.

Recommendations for Member States

In line with Recommendation 9 of the CR, Vocational education and training institutions have access to state-of-the-art infrastructure, have in place digitalisation strategies in line with national context and embed environmental and social sustainability in their programmes

17. The process by which the individual reviews his or her personal values, the meaning of work, as well as the level of personal and social well-being and, from there, contrasts them with the external and internal factors operating in the labour market (van der Klink et al., 2016).

and organisational management, thus contributing to the implementation of the UN Sustainable Development Goals;

R9. The study reveals the importance of:

- Exploit the potential of VET for inclusion of vulnerable groups through adapted training approaches enabled by technology and the development of their digital skills, towards their greater employability.
- Developing awareness of the importance of both employment and environmental sustainability and its relation to digital technologies.

g. Pedagogical and transformative potential of digital technologies

Digital technologies can be used to create and share high-quality accessible learning resources for VET. Interactive multimedia elements, enabled by digital tools, promote bimodal presentation of content (e.g. via images and text), increase student engagement, and promote accessibility for learners with disabilities. Collaborative content creation through wikis, online documents, and dedicated software can also enhance the quality of the resources. Furthermore, open education facilitates the sharing and adaptation of resources (Inamorato dos Santos, Punie & Castaño Muñoz, 2016). The use of repositories that host Open Educational Resources (OERs), that can be tailored to specific needs, regions, and languages (Ehlers et al., 2018), and the use of AI for finding adequate resources (Raffaghelli et al., 2023) are options highlighted in the literature. Similarly, open-source code allows for the customization of educational applications and tools.

Literature shows that these technologies can also transform pedagogy and how learners learn in VET education (European Commission,

2020) facilitating interaction, collaboration (Inayat et al., 2013; Borokhovski et al., 2016) and personalized learning (Fake & Dabbagh 2020). Digital tools enable diverse strategies such as fostering collaboration through online communication, project work (that mirrors better work situations), or peer feedback mechanisms. They also have potential to personalise the learning experience by using adaptive learning software, learning analytics and AI to tailor learning paths to learners' pace, prior knowledge, and interests (Kabudi et al., 2021; VanLehn, 2011; Wang et al., 2023). In addition, digital technologies can further contribute to personalisation by providing scaffolded instruction offering gradually guidance and feedback until a desired level is reached.

Moreover, digital technologies can be used to promote active learning. This is a key element in VET because digital learning improves learner-centric active learning in VET beyond traditional methods, such as online quizzes, collaborative projects, or discussions (European Commission, 2020) by enabling immersive experiences such as Virtual or Augmented reality (Chiang et al., 2022; Stender et al., 2021; Mulders et al., 2022) that simulate real-world problems in safe and controlled environments and allow experiential learning (European Commission, 2020). Virtual reality is identified as an appropriate training tool for 'DICE situations', this is dangerous, impossible, counterproductive, or expensive/ rare situations (Bailenson, 2018), which are relevant for VET learners facing complex tasks for the first time. They are also adequate for learners who might lack access to certain resources due to their location or socioeconomic background (European Commission, 2020). Other technologies such as digital twins (virtual replicas of objects that are connected to a real one and mimic its behaviour), can also enhance this type of training and simulated hands-on experiences (Kinsner & Saracco, 2019).

Indeed, the role of emerging technologies plays a key role in the goal of VET systems of preparing learners for the demands of the industry. Automation, intelligent systems, and data-driven processes (Lasi et al., 2014) characterize industry 4.0 and 5.0. Some technologies related to these elements are Artificial Intelligence, robots, Internet of Things (IoT), big data analytics, 3D printing, blockchain, or cloud computing. The future workforce will need to be familiar with these technologies (Pfeiffer, 2015). Integrating them into iVET programs can familiarize learners with these state-of-the-art technologies from an early stage, preparing them for the labour market.

BOX 7.

IDCVET PROJECT (EUROPE, ANNEX 1 FICHE 4)

The IDCvet initiative takes a comprehensive approach to unlock the transformative pedagogical potential of digital technologies in three sectors: metalworking and machinery production, social care, and hospitality. First, it offers a central repository for Open Educational Resources. Second, equips teachers with digital and pedagogical skills for incorporating technologies in their practices. Third, it produces learning scenarios that integrate emerging technologies in their activities, such as AI, 3D scanners, virtual reality, 3D printers, pneumatic simulator, mechatronics, laser cuts, welding robots. It also includes pedagogical tools such as online collaborative work tools or questioning tools. These scenarios can also be adapted for personalized learning. The objective is transforming pedagogies in a way that VET education prepares learners for the demands of Industry 4.0 and 5.0 and is delivered more efficiently.

Finally, it is important to note that online and blended learning could be appropriate modes of education for adult learners and working people, as they offer time and place flexibility, making it easier to fit learning into busy schedules. In the case of VET learners, responsible of the initiatives consider that it can be also, an option for dual VET programmes that combine school with on-the-job training. Moreover, online learning can also extend access to training and learning opportunities to individuals who have difficulties to access traditional VET programmes (ILO, 2021).

Recommendations for Member States

In line with Recommendation 12 of the CR to increase the attractiveness of VET based on modern and digitalised provision of training/skills, which states Vocational education and training programmes are delivered through an appropriate mix of open, digital and participative learning environments, including learning conducive workplaces and are supported by state-of-the-art and accessible infrastructure, equipment and technology, and versatile pedagogies and tools, for example ICT based simulators, virtual and augmented reality which increase the accessibility and efficiency of training provision, including for small enterprises;

R4. The study reveals the importance of:

- Taking advantage of digital technologies for personalisation of learning (i.e. to tailor education to individual needs and offer flexibility in paths, content, sector needs) and experimentation with digital simulated 'working environments'.
- Collaboration with industry to make use facilities that include state-of-the-art technology: e.g. fablabs, learning factories.¹⁸

- Provision of financial support and incentives to VET institutions and teachers to integrate emerging technologies into VET programs, transforming teaching practices and equipping learners with the necessary skills.

h. Teacher training for changing roles

The role of teachers is evolving. While knowledge transmission remains important, teachers are not anymore the only 'knowledge owners', but their role is changing towards guidance, orientation, instructional design, experts in certification etc. The inclusion of emerging technologies in education and the demand for new skills because of the digitalisation of the labour market is leading to new forms of innovation in teaching and learning processes. The VET sector has a dual innovative role: one inward, which involves integrating digitalisation in the training process in a smart way and one outward by generating new or improving existing products and services in companies and other organisations (European Commission, 2020). In this context of innovation and in the transition towards a Society 5.0, the role of teachers is fundamental to 'stir consciences' and stimulate imagination (Cortés-Rico, 2020). On the other hand, if teachers are to take the reins of innovation in VET, as mentioned above, they must be prepared to take the 'micro-decisions' (e.g. about what digital resources to use, how to include them in their methodologies, for what to use technologies, etc.) that will shape innovation (European Commission, 2020).

If digital competences, together with transversal competences are essential in the training of VET learners, as we pointed out in the previous section, teachers must develop their own digital and transversal competences as well (CEDEFOP, 2023). OECD (2019) considered the

18. Learning factories replicate real-world production environments to develop manufacturing skills, while FabLabs empower hands-on creation and digital prototyping.

need for teacher training in digital competences is considered as the second most important teacher training need in the world. The concept of Digital Competence in Teaching is considered by some authors as a way of being, thinking and acting as a teacher (Gisbert et al., 2019; Suárez-Guerrero et al., 2021). A specific European digital competence framework for teachers (DigCompEdu) has been developed which describes what it means for educators to be digitally competent in the following professional areas: communication, collaboration, and professional development; using, creating and sharing digital resources; teaching and learning; assessment; empowering learners and facilitating learners' digital competence development (Redecker, 2017). This notion has a specific and special meaning in VET, because of the significance that technology has here for the connectivity between VET centres and the world of work, for example in the design of work-based training (Cattaneo et al., 2021, 2022).

To fully embrace digital transformation and pedagogical innovation in VET, teachers need training and support in utilizing digital technologies effectively, but not only (Suárez-Guerrero et al., 2021). The digital competence of teachers is related with a form of pedagogical representation of the digital fact (Suárez-Guerrero, 2014). In this sense, it is important for VET teachers to be aware of the contributions and limitations of different forms of digital learning (European Commission, 2020). Therefore, including technology in the classroom impacts the pedagogical representation of teaching and learning (Anderson, 2016). The scientific literature, on the other hand, has shown the effect of teachers' attitudes towards digital tools and technology (Antonietti et al., 2022; Cattaneo et al., 2022; Tondeur et al., 2018).

In order to support the development of teachers' digital skills, European policies

have implemented three types of actions (CEDEFOP, 2022; European Commission, 2020):

a) development of competence frameworks (e.g. DigComEdu); b) development of tools (i.e. e-learning platforms, electronic libraries, self-assessment and self-reflection tools, open educational resources- OER platforms, education management applications, makerspace and 3D applications); c) support measures (i.e. digital strategies, plans and guidelines, adaptation of VET programmes, research initiatives, etc.).

The several types of measures mentioned above can be observed in the initiatives analysed. See, for example, the initiative in Box 8, which combines several of these measures.

BOX 8.

E-VET4AI (EUROPE, ANNEX 1 FICHE 12)

The initiative supports trainers active in mechanical training courses, in the development of new digital skills and confidence in the use of new teaching methodologies, to be integrated within more traditional teaching methods. Their aim is to support trainers in mechanical training courses, in the development of new digital skills. It also aims to develop their confidence in the use of new teaching methodologies, to be integrated within more traditional teaching methods on mechanical segment (Industry 4.0). The initiative offers a learning platform with four parts: 1) Self-awareness tool (SAT); 2) Case studies; 3) Training modules; 4) Tools for teachers. The e-VET4AI partnership has created an ecosystem in Europe. The network is open for participation to professional trainers.

Recommendations for Member States

In line with Recommendation 13 of the CR, which states Teachers, trainers and other staff in vocational education and training undertake initial and continuing professional development in order to: deliver high quality training; foster technical and digital skills and effective innovative training methods, including teaching in virtual environment; in line with state of the art vocational and digital pedagogy, work with digital learning tools, and in diverse and multicultural environments;

R3. The study reveals the need to:

- Support teachers and trainers in developing the emerging roles (guidance, orientation, instructional design, experts in certification).
- Acquire the knowledge on state-of-the-art technologies required by industry/sector and the necessary related teaching skills and competences.

4. CONCLUSIONS

The digitalisation of Vocational Educational and Training (VET) programs requires a comprehensive approach that goes beyond just technical skills and basic uses of technology in teaching. It is important to include skills that learners need (and will need) to live and work in today's (and tomorrow's) societies and adopt innovative teaching methods supported by technologies. Moreover, programs need to consider the human and social dimension (e.g. socioemotional skills, inclusion, and inequality consequences etc.) as they are key in digital societies.

Drawing on both, a literature review, and an analysis of a selection of initiatives, this report proposes eight key elements for achieving

this purpose and achieving successful VET digitalisation:

- Career Education and guidance.
- Development of information systems.
- Ecological approach and collaborations.
- Flexible accreditation mechanisms.
- Holistic development of learners' skills.
- Inclusion and sustainable human development
- Pedagogical and transformative potential of digital technologies.
- Teacher training for changing roles.

For each of these elements, we have presented a specific section where detailed sub-elements are developed, and specific recommendations provided (See point 3).

Our analysis of initiatives, while not necessarily representative in quantitative terms, suggests a current focus on developing IT resources, information systems, and teacher training (Figure 3). However, these initiatives often do not cover aspects such as inclusion and sustainable human development, career education and guidance or flexible accreditation mechanisms. Moreover, they lack a comprehensive approach, as they typically address only a limited number of the key elements identified for successful VET digitalisation.

FIGURE 3.

Checklist from analysed initiatives.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	N
Holistic development of learners' skills	✓	✓		✓	✓							✓	✓			✓	✓		✓	9
Teacher training for changing roles	✓	✓		✓	✓				✓			✓	✓	✓			✓	✓	✓	11
Pedagogical & transformative potential of digital technologies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	19
Flexible accreditation mechanisms															✓				✓	2
Career education and guidance						✓	✓	✓	✓	✓					✓					6
Development of information systems		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓		✓			12
Ecological approach in VET and collaboration	✓	✓	✓		✓			✓				✓			✓	✓	✓			9
Inclusion and sustainable human development	✓											✓	✓		✓					4

Source: own elaboration.

This current approach, while important, it is insufficient. A more integrated approach is required, one that recognises the interconnectedness of various elements. The eight key principles we identified function in a cohesive way, with each element complementing and reinforcing the others, creating synergies. For successful digitalisation of the VET sector, initiatives must pay attention to all these elements in a unified manner.

The proposed eight key elements can be applied at distinct levels. They can be considered at the micro level, focusing on the design of specific courses or the digitalisation of individual programs or schools. Alternatively, they can be applied at the macro level, guiding regional and national policies.

The eight elements and their sub-elements can serve as a first step for a framework for VET digitalization. This framework can be used as a rubric to guide reflection on the elements that should be included when designing digital strategies and policies on this sector. It can even be adapted into a formal rubric to assess the quality of VET digitalization initiatives and policies.

Furthermore, this list of key elements can be a first step in building a tool for evaluating existing programs and policies. Such a tool would ensure that programs are comprehensive and address social and human development aspects together with technical elements in an integrated way. Our proposal can be used to assess the design and implementation

process of these initiatives; however, impact evaluations remain also important and needed, as evidenced by the lack of information on this aspect that faced during the fieldwork of the study.

Implementing these elements cohesively requires significant investment, careful planning, and strong coordination. This stresses the importance of collaboration between government, industry, schools, educators, and learners. Such collaboration can facilitate that developed programs meet the evolving needs of the workforce and society and follow the eight guiding principles. Moreover, collaboration can promote program sustainability and scalability, which were identified as challenges in the analysed initiatives. By working together to digitize VET, regional and national stakeholders can benefit of its potential for regional development, innovation, and citizens and workforce readiness. ■



Chapter 2.

Emerging technologies and trends in VET

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ABSTRACT

In this chapter, the main findings from a study are presented focused on the identification of emerging trends and technologies in Vocational Education and Training (VET) that might require potential future policy actions.

The study utilised three data sources: 1) secondary grey literature, 2) VET Erasmus+ projects and COVE (Centers of Vocational Excellence) initiatives, as well as 3) consultation with experts.

The study found that VET is more exposed to digital changes than other educational sectors due to its proximity to the labour market, and hence to the digitalisation in the economy. Emerging technologies like artificial intelligence (AI), augmented reality (AR), virtual reality (VR), and blockchain-based ones (e.g., digital micro-credentials) have the potential to bring about fundamental changes within VET systems, such as making VET more learner-centric, enabling personalised learning, and reconfiguring the management of learners and teachers. Our results suggest that maximising the potential of emerging technologies requires the development of effective policies and support mechanisms, aimed for instance at improving the quality and attractiveness of VET, engaging with employers, and utilising big data analytics for skills anticipation.

Open educational practices, blockchain, and new credentialisation methods can contribute to the growth of the VET system, emphasizing the importance of adaptation to a fast-changing technological landscape and harnessing their potential for VET.

The results of this study also highlight the importance of generic soft skills in the face of digital and green transitions. In this regard, emerging technologies like AI could support the development of such generic skills in completely new ways.

Another significant finding is the widening gap between the digital worlds outside and inside VET, particularly affecting young people. The latest technologies are helping to bridge this gap, but there needs to be a wider consideration of what young people will need to learn to be fully prepared to live and work in an emerging digital world built around AI and other technologies that might both augment and constraint their agency and competence.

In conclusion, the study indicates a need for potential interventions to address the challenges faced by VET systems in adapting to emerging technologies and trends.

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1. INTRODUCTION

The aim of this study is to identify emerging trends and new technologies that are already affecting Vocational Education and Training, or will likely influence it in the near future, and might therefore require potential policy action.

The information sources used comprise a literature review, an analysis of selected VET Erasmus+ projects and Centres of Vocational Excellence (hereafter, CoVE) initiatives concerned with emerging technologies; and consultations with a panel of expert practitioners.

This chapter consists of the following sections:

- A brief description of the **methodological approach**.
- A literature review of:
 - **The historical context**, outlining how digital technologies in learning have evolved over time and the lessons that can be taken from this, as well as the challenges and developments in VET (which provide the essential context where such technologies are adopted).
 - **Current emerging trends and technologies**, organising these into four levels: meta (global trends in technology and work), macro (VET system), meso (school) and micro (teaching practice).
- Analysis on the **trends and technologies in a small sample of Erasmus+ projects and CoVE initiatives** and the outcomes of consultations with the sample of expert practitioners.
- **Conclusions and recommendations** synthesised from the evidence presented in the report.

In this study, we first examined the nature of digitalisation in VET, including what makes VET distinctive from other sectors of education.

Secondly, we assessed the extent to which the latest wave of socio-technical innovation is different from previous ones. Thirdly, our focus shifted to the implications of emerging technologies for learners, teachers, and educational practices. Fourthly, we reflected upon the challenges of implementation, with particular attention to the impact of cutting-edge technologies.

2. METHODOLOGY

As mentioned before, this study was based on three main data sources:

- a. a concise and focused review of a mix of grey literature, academic publications, and policy reports, that provided the basis for a synthesis of relevant studies and policy documents;¹⁹
- b. an analysis of trends in CoVE initiatives and Erasmus+ projects aimed at introducing the latest technologies into VET, as a means of exemplifying trends in the digitalisation of the sector over the last decade;

19. Key sources include: Tuomi, I., Cachia, R. and Villar Onrubia, D., *On the Futures of Technology in Education: Emerging Trends and Policy Implications*, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308; International Labour Organisation (2023) *Towards lifelong learning and skills for the future of work: Global lessons from innovative apprenticeships*. https://www.ilo.org/skills/projects/adult/WCMS_872242/lang--en/index.htm; International Labour Organisation (2022) *The digital transformation of apprenticeships: Emerging opportunities and barriers*. https://www.ilo.org/skills/projects/adult/WCMS_861712/lang--en/index.htm; European Commission (2020) *Innovation and Digitalisation: A report of the ET2020 Working Group on Vocational Education and Training*. <https://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=8365&furtherPubs=yes>; ETF (2018) Digital skills and competence and digital and online learning. https://www.etf.europa.eu/sites/default/files/2018-10/DSC%20and%20DOL_0.pdf; UNESCO (2023) Technology in Education. A tool on whose terms? Global Education Monitoring Report Summary. <https://www.unesco.org/gem-report/en/technology>

- c. consultations with project coordinators and some partners of a carefully selected sample of recent Erasmus+ projects, who comprised a panel of expert practitioners to provide in-depth insights and validate emerging findings.

2.1 Literature review

The study started with a narrative²⁰ literature review (examination of recent literature) aimed at elucidating the intricate interplay between VET and digitalisation, providing a comprehensive account of the historical evolution, current trends, and emerging technologies in this field. The purpose of this review is to synthesize existing grey and academic literature to capture the depth and breadth of digital technologies' impact on VET, identify persisting challenges, and anticipate future directions for policy and practice. The review is organized into three main sections, each addressing distinct yet interconnected dimensions of the topic: the historical context, current and emerging trends, and future implications.

By synthesizing the wealth of literature on digital technologies in VET, this review endeavours to offer valuable insights for educators, policymakers, and stakeholders involved in the continuous evolution and improvement of the sector.

2.2 VET innovation projects

Two types of projects were used to identify innovative practices within the sector and potential experts for the panel: Erasmus+ projects focusing on innovative technologies,

and Centres of Vocational Excellence also funded under Erasmus+.

The sample of Erasmus+ projects was chosen from those that were using the most advanced technologies on the basis that, a priori, they were most likely to be able to provide insights into emerging trends and technologies.²¹ In addition, more recent Erasmus+ projects from the database were prioritised, under the assumption that they would already have (some) results since they would have gone through a process of development and produced outcomes; therefore, it was reasonable to assume that they were more likely to have the most comprehensive or systematic view of current (and even future) challenges and opportunities. It was also deemed appropriate to select projects that had already been recognised as 'Good Practice Projects' by the Erasmus+ programme as a means of ensuring excellent quality. During the research, it also became clear that the experts selected through this process had considerable experience, often having been involved in digital learning for many years or participated in numerous Erasmus+ projects before.

On this basis, an extensive list of projects was initially identified from call year 2020 that were also active in 2023 and which were using AI, AR/VR, and 3D²² and which had been classified as good practice projects. Table A (Annex) shows the results of applying these criteria. Some projects appeared against more than one technology.

20. Booth, A., Papaioannou, D., & Sutton, A. (2012). [Systematic approaches to a successful literature review](#). London: SAGE Publications Ltd.

21. This is not to say that advanced technologies would not have been developed in projects where more traditional tools like online, e-learning, open educational resources and learning management systems were being/ had been used, but it is reasonable to assume that if they had a strong focus they would emerge in the sub-topic search.

22. Terms such as learning analytics, extended reality, mixed reality and blockchain were also searched for but the number of projects was found to be very small and did not include any good practice projects.

In terms of the final selection, an additional factor to take into account was whether projects were categorised under the topic ‘New innovative curricula/educational methods/development of training courses’ since, in light of the analysis based on the literature review, this connection was deemed to be important if not vital in ensuring positive outcomes in terms of teaching and learning.

Based on the above-mentioned criteria, the final selection included the following projects:

- Didactic innovation labs (DIOS) – digitalisation experts in VET [Didactic innovation labs \(DIOS\) – digitalisation experts in VET Erasmus Project – Erasmus Projects and Activities](#)
- Fostering industry 4.0 and 3D technologies through social entrepreneurship: an innovative programme for a sustainable future– 3D2ACT [3d2act.eu](#)
- Safe Earthworks Training with the use of Augmented Reality setAR | [Safe Earthworks Training with the use of Augmented Reality](#)
- Industry 4.0 in healthcare [Industry 4.0 in Healthcare Erasmus Project – Erasmus Projects and Activities](#)
- Art & Creative Craft Enterprises for Successful Streaming of 3D Printing [Art & Creative Craft Enterprises for Successful Streaming of 3D Printing Erasmus Project – Erasmus Projects and Activities](#)
- 1Point: VET training using the one-point lessons approach [Home - 1point project](#)

In terms of country coordinators, this sample provided a good spread across countries, with diverse types of VET systems (from DE to EL); population size (from FR to SI), geographic location (east-west, north-south) and position on the EC’s Digital Economy and Society Index. Likewise, the sample offered a good spread across sectors.

Another source of relevant cases was the Centres of Vocational Excellence, funded under Erasmus+ too. A review of the CoVE factsheets²³ revealed several potential cases and showed that digitalisation had become more prominent in the latest call than before (often linking digital and green topics). Although this meant that three out of the five selected started only in 2022, and would not have results yet, it was considered that this would be a benefit in terms of looking at emerging trends and tapping into the latest thinking. The initial extensive list shown in Table B (Annex) was identified.

In sum, the final number of cases were six, three CoVEs initiatives and three Erasmus+ projects. Project coordinators were approached by email in December 2023, explaining the study and inviting them to participate. Two of the original selected projects declined the participation in the study, so two additional projects were selected as replacements and both responded positively. The final selection is shown in Table C (Annex).

2.3 Consultation with experts

There were two rounds of exchanges with experts from selected Erasmus+ projects, including CoVEs (for more information about the experts, please see Table F in Annex). Once projects were selected and experts agreed to participate, they were sent a topic guide (see Table D in Annex), and one-hour discussions were conducted online in January and February 2024. Many project coordinators invited colleagues and partners to participate so that over 10 expert practitioners eventually took part.

After the first round of discussions, a short paper was prepared that synthesised the

23. <https://ec.europa.eu/social/main.jsp?catId=1501>

discussions and was circulated for the second round of exchanges with the experts for their validation and review. A further round of questions was also asked to further probe certain key topics (see Table E in Annex). Responses were received from all participants by early March 2024. Findings from this round were integrated into the paper and the finalised paper became section 4.2 of the study report.

3. FINDINGS: NARRATIVE LITERATURE REVIEW

The narrative literature review covered two main topics: i) **the historical context**, outlining how digital technologies in learning have evolved over time and the lessons that can be taken from this, and the challenges and developments in VET which provide the essential context into which technologies are introduced; and ii) **current emerging trends and technologies**, organising these into four levels: meta (global trends in technology and work), macro (VET system), meso (school) and micro (teaching practice).

3.1 Historical Context. Where are we coming from and what can we learn from the past?

An important question is what costs or obstacles inhibit the adoption of technologies. Are some obstacles inherent within VET systems destined to be repeated with each successive

wave of digitalisation, even for comparatively 'low tech' solutions? In addition, what might be the implications for more complex technologies? Why do some technologies remain whilst others are displaced by alternatives? What is driving the current wave of innovation adoption in VET?

3.1.1 Technology in education trends

To see where we might be going next, it helps to consider where we have come from. Figure 4 provides an overview of developments in education and training using technology since the 1980s. In terms of hardware, it shows the evolution from the first use of audiovisual equipment and fixed computer terminals in classrooms to the use of smartphones and cloud-based services. In relation to content, it shows the inter-related shift from educational programmes recorded on cassettes to the most recent VR and AR simulations and the development of blockchain to support the increasing use of micro-credentials and digital badges – a shift marked by increasing sophistication as computing power and by the major stimulus given to decoupling of learning from physical locations through the advent of the internet and the use of open educational resources (including MOOCs) and educational apps. It also shows the introduction of technology into new areas like skills anticipation, with the ability now to analyse changes in skill needs through the analysis of online job advertisements. Currently, we stand on the edge of a new era with the sudden surge in AI and associated learning analytics, discussed further below.

FIGURE 4.

Technological developments affecting teaching and learning in VET.

1970s and 80s	1990s	2000s	2010s	2020s
TV Videotapes, cassettes Computer-aided Instruction First programs exclusively for educational use Intelligent tutoring systems	Multi-media PCs Laptops CD-ROMs, including simulations Interactive whiteboards Early internet access	DVDs CD-ROM/DVD drives integrated into devices, capacity Increases Learning management systems Smartphones, apps, Bring your own device MIT, Open Courseware initiative ePortfolios Internet access 3G to 4G	iPads, tablets 3D design and printing VR headset Educational apps MOOCs Growing Open Educational Resources/Courses Blockchain and digital badges Learning analytics, AI Big data, web scraping on skills, skills taxonomies First 5G networks	Generative AI Open learner models Personalised tutoring systems XR headsets, metaverse Datafication of learning 6G networks

Source: Developed from McCoshan, A. (2022) VET and work-based learning: can e-learning meet its needs? Presentation to School Education Gateway webinar on VET and Work-based Learning, 11th June 2022.

The following perspective raises several critical issues for the current study.

First, there is the fact that **we have been dealing with technology in education and training for a long time**, with a ‘digital age’ emerging in the 1970s and 1980s and the ‘internet age’ commencing in the 1990s.²⁴ This is important to bear in mind given that it often seems as if digitalisation is a ‘new’ topic: even though some of the technologies are indeed new, there ought to be a deep pool of experience and lessons to draw upon regarding how to implement technologies. It often seems

as though education is reinventing the wheel when it comes to policies and practices around digitalisation but, at the same time, it is widely recognised that we do not know enough about the effects of technology on learning from a well-evidenced scientific perspective (Giannoutsou et al., 2024)²⁵. Despite the potential positive effects of the use of digital technologies in education and training systems, there are other approaches to this topic, such as the Swedish government’s, which recently abandoned its educational digitalisation plans citing lack of tangible evidence of the

24. Howard, S. K. & Mozejko, A. (2015). Considering the history of digital technologies in education. In M. Henderson & G. Romero (Eds.), *Teaching and Digital Technologies: Big Issues and Critical Questions* (pp. 157–168). Port Melbourne, Australia: Cambridge University Press; see also <https://read.aupress.ca/projects/25-years-of-ed-tec>

25. Giannoutsou, N., Ioannou, A., Timotheou, S., Miliou, O., Dimitriadis, Y., Cachia, R., Villagrà- Sobrino, S. and Martínez- Monéz, A., *Unpacking the impact of digital technologies in Education*, Publications Office of the European Union, Luxembourg, 2024, doi:10.2760/214675, JRC132998.



educational benefits.²⁶ This challenge is not unique to technology though since an inherent issue of evaluation in education is the complexity of teaching and learning processes and the difficulties intrinsic to trying to ‘isolate’ one factor to assess its effects.

Secondly, it should be noted that Figure 4 shows (roughly) the decades when technologies appeared and began to be used, and does not show how long technologies persisted, so it is important to point out that **whilst technologies come and go, the process by which they are superseded by ‘newer’ technologies can take time**. Many of the older technologies like TVs, videotapes and cassettes continued into following decades; videotapes were not finally phased out until the early 2000s by DVDs. This phenomenon could be related to the theory in media called the media displacement theory, which proposes that people have limited time and participation in a specific communication activity, taking away time from the participation in others. Therefore, when a new communication technology is introduced, people will have less time for other communication activities, but this process will be gradual and slow (Hall and Niche, 2020)²⁷. This is important to keep in mind when looking at ‘emerging’ technologies. Some technologies have been around for decades and appear to have become ubiquitously embedded into teaching practice, such as the interactive whiteboard, which is relatively easy to incorporate into classroom practice. Furthermore, it is important to acknowledge that a ‘typical’ classroom or school will contain a mix of technologies:

*Traditionally, in every classroom multiple technologies are used, and some of them, such as textbooks, black- or white-boards, and wallpaper charts are universally used and not regarded as technologies anymore [...] Some other technologies have recently been discarded or are only used on rare, special occasions (e.g. radio, TV). Other forms of technology, such as different ICT applications, are in different phases of their adoption cycles [...]*²⁸

Thirdly, and related to the preceding point, we need to consider **how decisions are made regarding the adoption of technologies**. Decisions about which technologies to use and in what contexts are often taken in practice at the level of the school and the teacher: ‘at some point most innovations [...] involve [...] ‘micro- decisions’ by teachers and trainers in classrooms and workplaces – even when large-scale change programs are involved’.²⁹ Technological adoption depends, axiomatically, on (perceived) costs and benefits (by actors within VET systems). A priori, one type of technology will be replaced by a better alternative when (perceived) benefits of adoption (e.g. in terms of improved teaching and learning outcomes) outweigh the costs (e.g. related to the necessary time to invest in learning how to use modern technologies). This may explain the persistence of ‘low-tech’ technologies (with better perceived ‘cost-benefit equations’) despite the appearance of apparently better, but more complex and costly ‘hi-tech’ alternatives. As pointed out in UNESCO’s 2023 Global Education

26. Switching off: Sweden says back-to-basics schooling works on paper. *The Guardian*. 11th September 2023. <https://www.theguardian.com/world/2023/sep/11/sweden-says-back-to-basics-schooling-works-on-paper>

27. 1. Hall JA. Niche, Media Displacement, and Multimodal Relationships. In: *Relating Through Technology*. Advances in Personal Relationships. Cambridge University Press; 2020:70–90.

28. Boštjan, Š. and Šorgo, A. (2016) The acceptance and use of interactive whiteboards among teachers: Differences in UTAUT determinants between pre- and post-adopters. *Computers in Human Behavior* Volume 64, November 2016, Pages 602–620

29. p. 25, European Commission (2020). *Innovation and Digitalisation. A report of the ET 2020 Working Group on VET*.

Monitoring Report, educational technology need not be advanced to be effective.³⁰

Fourthly, **some use-cases of technology have persisted since the very beginning of computer-aided systems.** In the mid-1980s, it was possible for undergraduates at the University of Cambridge to be supported in future career choices by a computerised system, which presented the user with a skills test, and then, based on the results, they were provided with a selection of possible career options. Such systems are still with us, even if the underlying technology might have changed, which has typically helped to make them more ubiquitous (the Cambridge system relied on the university's computer system), more up to date with and adapted to the labour market needs, and thus, more helpful to users.

Fifthly, we need to consider the actual **effects of technologies in teaching in VET.** In terms of teaching practice, research from across education shows that whilst digital technology has 'dramatically increased access to teaching and learning resources',³¹ a modern technology may be incorporated into teaching practice with trivial effect on pedagogy or it may be used by teachers to support new teaching and learning methods:

*Where digital technologies do affect learning, it is evident that different digital technologies vary in their effects on learning processes and, equally, the same digital technology may also vary in its effects. What makes the difference is how technology is used.*³²

30. p. 5, UNESCO (2023) Technology in Education. A tool on whose terms? Global Education Monitoring Report Summary. <https://www.unesco.org/gem-report/en/technology>

31. p. 5, UNESCO (2023) Technology in Education. A tool on whose terms? Global Education Monitoring Report Summary. <https://www.unesco.org/gem-report/en/technology>

32. p. 34, European Commission (2020). [Innovation and Digitalisation. A report of the ET 2020 Working Group on VET.](#)

This in turn depends on processes of pedagogical innovation and, as the Organization for Economic Cooperation and Development (OECD) has pointed out:

*Pedagogical innovations require deep changes in teachers' practices and roles in which they are co-designers. Innovations in teaching and learning are not so much assimilated as adopted progressively and creatively by teachers who know how to use their own experiences as 'anchors' for implementation and innovation.*³³

Sixthly, in terms of effects on learning, technologies may have distinct types of impact depending on a wide range of factors. On the one hand, they can make learning more engaging and have positive impacts on learning outcomes, whilst at the other extreme, they can have hardly any effect at all or even negative consequences.³⁴ In its overview, UNESCO's 2023 Global Education Monitoring Report Summary was circumspect in its support for education technology, concluding that it 'has brought small to medium-sized positive effects to some types of learning.'³⁵ UNESCO has also shown how the conditions under which digital learning was rolled out during the Covid-19 pandemic had 'numerous unintended and undesirable consequences' and questions 'whether more and faster integration of technology is desirable for learners, teachers and schools and if ed-tech is [...] a key ingredient of educational resilience'.³⁶ In the end, the 'depth' of the effect

33. p. 24, OECD (2018) Teachers as designers of learning environments, Paris: OECD

34. See chapter 3, European Commission (2020). [Innovation and Digitalisation. A report of the ET 2020 Working Group on VET.](#)

35. p.5, UNESCO (2023) Technology in Education. A tool on whose terms? Global Education Monitoring Report Summary. <https://www.unesco.org/gem-report/en/technology>

36. p. 18, UNESCO (2023) [An ed-tech tragedy? Educational technologies and school closures in the time of COVID-19.](#)

of a technology is likely to depend on both the inherent features of the technology and how teachers or trainers want to use it – the latter of which depends on a range of other factors such as the availability of professional development support.

In a study based on interviews with a hundred 6-12 year old children and parents across ten EU countries on perceptions and practices related to emergency remote schooling during and after the spring 2020 lockdown, Cachia et al (2021)³⁷ also stated that, due to the Covid pandemic and the change in the nature of schooling, both children and parents differentiated between a ludic and academic use of the digital devices. The displacement of digital devices from mostly leisure to academic use caused some discrepancy in children's motivation and expectations. Many children were eager to use technology for entertainment, to be creative and to learn. Despite such eagerness, some students were surprised to find themselves bored and unmotivated during remote schooling. Parents also reported that their children found it harder to stay focused when taught online.

An important question is **whether the current wave of emerging trends and technologies is so different that it may involve changes on a scale and depth we have not seen before**, triggering a set of unavoidable shifts in teaching and learning. Certainly, the latest simulation technologies (e.g. VR, AR, XR) offer new learning experiences and can provide teachers and learners with new qualities and quantities of feedback. However, an important challenge here is set out in Tuomi et al (2023):

37. Cachia, R., Velicu, A., Chaudron, S., Di Gioia, R. and Vuorikari, R., Emergency remote schooling during COVID-19, EUR 30866 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-42550-2, doi:10.2760/613798, JRC125787.

*Emerging technologies are constantly perceived as vectors of change with, presumably, the capacity to fix or neutralize the most pressing challenges faced by education. They are designed, sold, bought, and adopted with the hope that they will radically transform, for the better, learning within formal education and beyond. ... the last four decades of research reveal that technologies alone have not been able to transform education, improve learning, resolve inequalities, or reduce teachers' workloads, while also showing that the unintended consequences that may result from technology adoption can be hardly predicted and that actual impact always depends on socio-technical contexts and factors.*³⁸

In this context, we run the risk of perpetually being pushed along by hype as we move from one development to the next. Reflecting on such tensions, Facer and Selwyn have advanced a 'mixed outcome of educational technologies' thesis which identifies a set of recurring themes from the past 40 years, shown in Figure 5.³⁹

38. p. 11, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308

39. Facer, K. and Selwyn, N. (2021) Digital technology and the futures of education – towards 'non-stupid' optimism. Paper commissioned for the UNESCO Futures of Education report. <https://unesdoc.unesco.org/ark:/48223/pf0000377071>

FIGURE 5.

Facer and Selwyn's Mixed Outcome Thesis.

1. Digital technology alone does not transform education: institutional structures and forms of education have not fundamentally changed but that does not mean they are outdated; they may still be rational in terms of wider educational goals.
1. Digital technology does not improve learning: there is little robust evidence that technology use leads to sustained 'improvements' in learning independent of teacher and other contextual effects.
1. Digital technology does not fix inequalities: research tends to find a recurring tendency for technological interventions to benefit most those who are already engaged and advantaged [the Matthew effect].
1. Digital technology does not alleviate teachers' work: digital technologies tend to augment and exacerbate teachers' workloads, whilst also de-professionalising teaching by 'unbundling' practice into disconnected work processes that require little conceptual ability.
1. Digital technology use often results in unintended consequences that are impossible to predict and stretch beyond matters of 'learning': such consequences are often unacknowledged in discussions of technology and education and can counter any direct learning benefits.
1. Any 'impacts' are context specific and tied with socio-technical factors: educational changes associated with digital technologies are not essential properties of the technology per se but heavily influenced by local contexts and cultures.

Source: Source: Facer, K. and Selwyn, N. (2021) Digital technology and the futures of education – towards 'non-stupid' optimism. Paper commissioned for the UNESCO Futures of Education report. <https://unesdoc.unesco.org/ark:/48223/pf0000377071>.

Finally, we need to consider how teachers might be expected to know or to work out which digital technologies best suit their teaching and learning goals. This has become an increasingly challenging issue with the proliferation of technologies in recent years. This has gone alongside the growth of private suppliers of digital learning materials and tools, i.e. the 'edtech' market. As UNESCO's Global Education Monitoring Report points out, 'There is little robust evidence on digital technology's added value in education' which it attributes in part to technology evolving faster than it is possible to evaluate it (education technology products change every 36 months on average), and to the fact that much (positive) evidence comes from suppliers which can contrast with (negative) independent analysis.⁴⁰

Overall, the development and implementation of digital education **have been evolutionary in pace and effect**: a relatively long and slow process as compared to what is usually thought to be disruption. At the same time, it is evident that in the last 10-15 years, there has been a major increase in the potential to decouple teaching and learning from time and place and in the ability to offer learners new and different experiences, and provide faster, more tailored feedback. An important question is whether these trends will be accelerated in the coming years with the advent of 6G networks and generative AI or take us in completely new directions.

40. p. 5, UNESCO (2023) Technology in Education. A tool on whose terms? Global Education Monitoring Report Summary. <https://www.unesco.org/gem-report/en/technology>

3.2 Trends in VET

Alongside the trends discussed in the preceding section, we need to take stock of the overall situation in VET. There are two elements to this: (i) the long-standing structural challenges that have affected VET for the last two decades and which, in many countries and local contexts, still persist; and (ii) the shifts that have been taking place in teaching and learning and in educational management and administration, which are shaping VET. These two related aspects provide the context into which technologies have been and will be developed, implemented, and help to signal futures for technology in VET.

3.2.1 Long-standing challenges in VET

Figure 6 provides a diagrammatic representation of the long-standing (structural) challenges with which much formal state-provided VET in Europe still grapples. VET is often narrowly (and implicitly) defined as provision funded and delivered by the state. However, a wider definition can also be used, which sees VET as comprising any training related to the labour market taken by individuals at any point in their lives. Such a wider definition is important when looking at VET futures since developments are challenging and modifying the boundaries between public and private provisions in VET. Also, it is crucial to mention the crucial role to be played by VET systems to support the twin transition so learners and workers' digital skills are of paramount importance.⁴¹

At the core of this challenge is the quality and attractiveness of VET.⁴² This stems from a set of

reinforcing processes involving poor engagement between the VET system and employers, which leads to programmes that are poorly tuned to skill needs in the labour market. For their part, employers' weak engagement is underpinned by factors such as weak collective organisation and a highly competitive environment for staff, which undermines collective action on training. At the same time, it is important to emphasize the need of understanding innovation, skills, and VET's role in supporting innovation and to bridge the gap between VET institutions and companies, expand the potential user base, and balance top-down and bottom-up interests.⁴³

For their part, learners experience programmes which have a poor record in getting them into employment, reinforcing the role of VET as the choice of last resort, with a status below that of general (higher) education. Of course, these patterns are not equally observable in all VET contexts. Dual apprenticeship systems, for example, successfully counter the processes described, and at higher educational levels, the boundary between VET and general higher education is becoming increasingly blurred in some countries.⁴⁴ However, they do still apply in many countries and for many occupations.

a core aim of EU Member States since the launch of the Copenhagen process in 2002. See for example, the 2020 Osnabrück Declaration on vocational education and training as an enabler of recovery and just transitions to digital and green economies https://www.cedefop.europa.eu/files/osnabrueck_declaration_eu2020.pdf

43. McCoshan, A., Melstveit Roseme, M., Mobilio, L. and Herrero, C., SELFIE WBL scoping study: a potential role in linking companies and regional innovation with VET schools, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/43349, JRC134782. [JRC Publications Repository - SELFIE WBL scoping study: a potential role in linking companies and regional innovation with VET schools \(europa.eu\)](https://publications.jrc.ec.europa.eu/publication/?id=JRC134782)

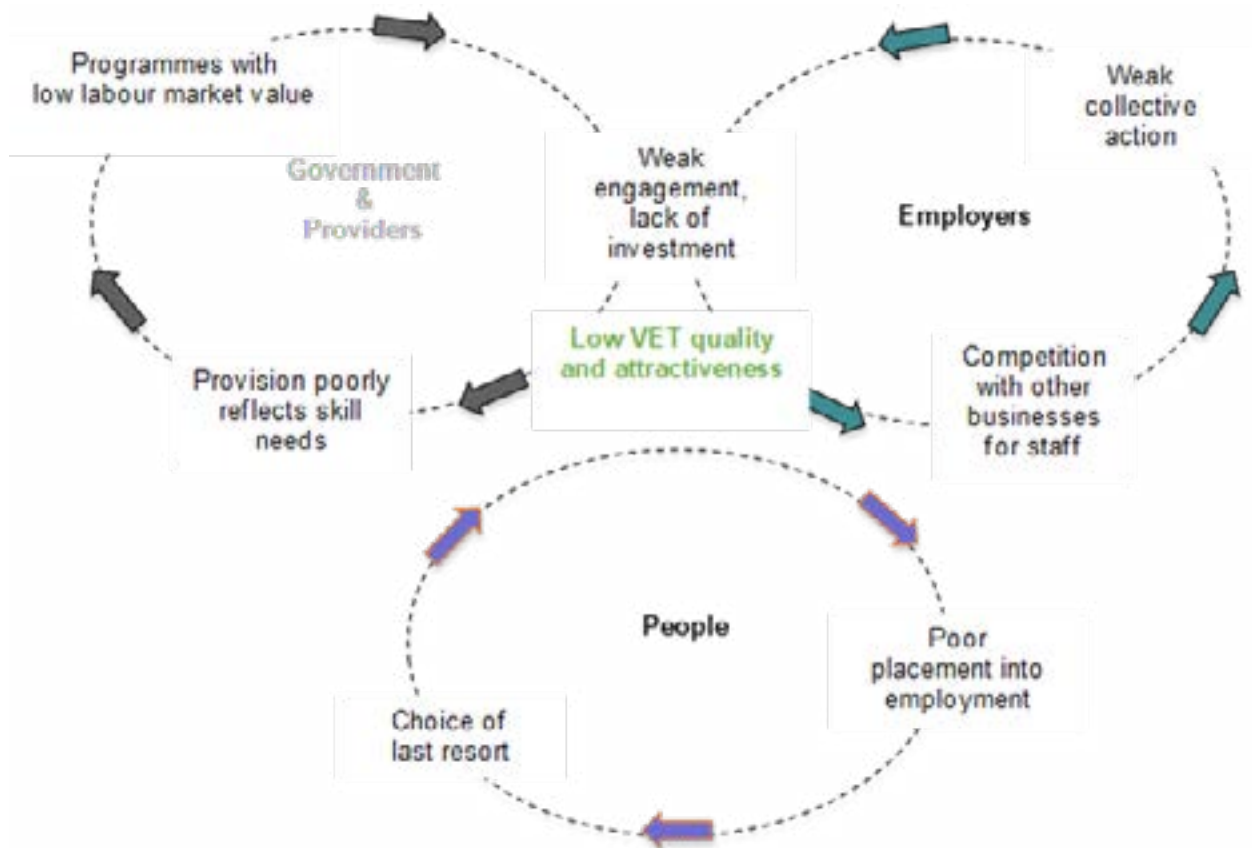
44. Cedefop (2019). The changing nature and role of vocational education and training in Europe. Volume 6: vocationally oriented education and training at higher education level. Expansion and diversification in European countries. Luxembourg: Publications Office. Cedefop research paper; No 70. <http://data.europa.eu/doi/10.2801/0200>

41. [VET needs to go digital | CEDEFOP](https://www.cedefop.europa.eu/en/publications/9200) Cedefop. (2025). VET needs to go digital: upgrading the backbone of Europe's twin transition. Publication Office of the European Union. Policy brief. DOI: 10.2801/2388199. <https://www.cedefop.europa.eu/en/publications/9200>

42. Improving VET's quality and attractiveness has been

FIGURE 6.

Long-standing challenges in formal, state-provided VET in Europe.



Source: McCoshan, A. (2020) Developments in Digitalisation and Innovation in Vocational Education & Training. Presentation to ETF/ERISEE (Education Reform Initiative of South-Eastern Europe) webinar, 25th November 2020.

3.3 Developments in policies and practice in VET

Partly to deal with these challenges, and partly in response to wider social, political, and economic trends, a range of developments have been taking place in VET in the last two to three decades in Europe,⁴⁵ which can broadly be summarised as follows:

In the **administration and management** of VET there has been a trend towards increasing

autonomy for VET institutions and trying to improve employer engagement to better tune programmes to skills needs. Teacher and school level autonomy has a significant role to play in digitalisation because even in centralised systems, teachers and schools often have considerable freedom to make decisions about classroom pedagogies. Indeed, observable patterns of technology usage reflect not just national policies or school plans but the decisions of thousands of individual teachers. Regarding the improvement of employer engagement, there is a mixed pattern across Europe, with some countries with school-based VET systems making progress, but others struggling to do so, and even some dual systems signalling difficulties in retaining

45. See Cedefop (2020). *Vocational education and training in Europe, 1995-2035: scenarios for European vocational education and training in the 21st century*. Luxembourg: Publications Office of the European Union. Cedefop reference series; No 114. <http://data.europa.eu/doi/10.2801/794471>

historically important levels of employer involvement.

At the level of qualifications and programmes, significant developments include national qualifications frameworks and qualifications based on learning-outcomes, often accompanied by the structuring of qualifications into modules – all with the aims of strengthening labour market relevance, developing lifelong learning and more learner-centred pedagogies, and supporting individualisation of learning. Whilst such structural developments have spread widely, the goals of opening up individualised learning pathways have yet to be realised, despite their promotion for over 20 years in some European policies and programmes. CEDEFOP, in collaboration with other institutions, have collected relevant and detailed information on qualifications in EU countries.⁴⁶

In **teaching and learning**, there has been a general trend towards the adoption of more learner-centric methods. This is not unique to VET, but a general trend is based on constructivist educational theory, which stresses the experience of individual learners in the learning process, in which teachers should act more as facilitators of learning, moving away from a more traditional role as conveyors of bodies of knowledge.⁴⁷ Solid evidence as to how far such methods have actually penetrated VET is hard to come by.

When considering the above trends, it is essential to note that, in practice it may be difficult to generalise about VET in any

given country: developments can vary widely depending on the sector, individual programmes, and individual localities/schools – as well as the availability of technology. Indeed, when it comes to the latter issue, it is also important to factor in sectoral differences in the impact of technology.

3.4 Current and emerging technologies

In the context of the developments outlined in the previous section, what are the key trends and emerging technologies that should be considered? This section begins by looking at key trends at meta level before examining developments at three levels: i) macro-level, which is concerned with the VET system/policy level; ii) meso- or school level, where the focus is on issues such as management and planning of learning and engagement with employers; and iii) micro-level, that examines practices around teaching, learning and assessment.

3.4.1 Meta-level trends

1. Blurring the boundary between the physical and the virtual, between humans and machines

At a **meta level**, several trends are key. First, it has been argued that we are in (or entering) a '**post-digital era**' in which 'emerging technologies and associated trends [...] are profoundly interconnected with each other, while underpinned to a considerable extent by data and the increasing datafication of all aspects of society';⁴⁸ and in which 'the fusion of

46. [VET and qualifications across borders | CEDEFOP](#)

47. See also Cedefop (2022). *Teachers and trainers in a changing world: building up competences for inclusive, green and digitalised vocational education and training (VET): synthesis report*. Luxembourg: Publications Office. Cedefop research paper, No 86. <http://data.europa.eu/doi/10.2801/53769>

48. p. 9, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308

digital and physical creates what could be regarded as a new infrastructure for knowing and action.⁴⁹ ‘Post-digital’ refers to ‘a state of becoming where the human and the digital are interacting, co-creating, and merging in ways that are beyond imagining’⁵⁰ and to ‘our raising awareness of blurred and messy relationships between physics and biology, old and new media, humanism and posthumanism, knowledge capitalism and bio-informational capitalism’.⁵¹ At a concrete level, these trends are driven by emerging technologies like 6G networks, machine learning and artificial intelligence or learning analytics, which have vastly increased our capacity to gather, collate and analyse data, among other actions. In teaching and learning, such developments are raising questions about how far humans can be replaced by machines or, more subtly, the extent and ways in which humans will need to intermediate between learners and technology. This is particularly relevant to VET, due to its proximity to the labour market and the nature and content of the training provided.

2. Technology as a threat to cognitively based occupations

Another key meta-level development to highlight in the VET context is the **changing nature of work and skills requirements**,⁵² which are directly influenced by the development and uptake of technologies such as AI. Automation based on modern hardware and software has been replacing skilled labour for several decades, first in mining and manufacturing processes and later in service sectors like banking and finance (e.g. where online banking has made the need for physical banking nearly obsolete). The advent of generative AI represents the latest wave of such disruptions, constituting a major threat to many cognitively based occupations that once were perceived as immune from major technological effects. Recent estimations suggest that around two-thirds of current jobs are exposed to AI automation, and that generative AI could substitute up to one-fourth of current work.⁵³ The need for upskilling and reskilling and boosting digital skills⁵⁴ is now a major issue for VET systems.⁵⁵

49. p. 19, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308

50. p. 754, Ball, J., & Savin-Baden, M. (2022). Post-digital Learning for a Changing Higher Education. *Postdigital Science and Education*, 4(3), 753–771 <https://doi.org/10.1007/s42438-022-00307-2>

51. p. 896 Jandrić, P., Knox, J., Besley, T., Ryberg, T., Suoranta, J., & Hayes, S. (2018). Postdigital science and education. *Educational Philosophy and Theory*, 50(10), 893–899. <https://doi.org/10.1080/00131857.2018.1454000>

52. See, for example, <https://www.cedefop.europa.eu/en/projects/european-skills-and-jobs-survey-esjs>; <https://digital-strategy.ec.europa.eu/en/policies/desi>; <https://publications.jrc.ec.europa.eu/repository/handle/JRC117505>.

53. Briggs, J., & Kodnani, D. (2023). The Potentially Large Effects of Artificial Intelligence on Economic Growth [Global Economic Analyst]. Goldman Sachs

54. https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2246

55. Political rhetoric recognises ‘upskilling and reskilling’ but conceptually it is also helpful to think in terms of what one might term ‘side-skilling’ where an individual add skills at a similar level to their existing skills portfolio rather than re-tuning existing skills or adding skills at a higher level.

3. Increasing importance of generic soft skills

As well as shifting the nature of the technical skills needed in the workplace, it is widely recognised that these changes will also change the focus of many occupations towards generic 'soft' or transversal skills such as critical thinking and teamwork, which, though long demanded by employers, as evidenced by numerous skill needs surveys, may become an even more valuable asset in the labour markets of the future when innovation and knowledge creation become key to companies across sectors. The green transition is pushing VET systems in the same direction.⁵⁶ As Tuomi et al. (2023) point out, AI has the potential to give greater agency in learning to learners than existing digital tools and this might better support the development of such generic skills: 'In many influential intelligent tutoring systems, the student simply had to perform actions determined by the machine. Editable open learner models that allow the student to interact with the system, give the user some power over the machine' (Tuomi et al., 2023, p.46). The increase in importance of soft skills also raises questions about whether and how competences like communication and problem-solving can be credentialed (e.g., through micro-credentials).

These meta-level developments are driving and framing shifts within VET systems. To understand these changes comprehensively, it is important to consider them across three

56. Hence the development of, for example, GreenComp by the JRC, the framework related to competences for the green transition. https://joint-research-centre.ec.europa.eu/greencomp-european-sustainability-competence-framework_e

distinct yet interconnected 'levels'. These levels represent the primary domains affected by each trend or technology. However, it is crucial to acknowledge that these levels are deeply intertwined, with advancements at any one level impacting the others.

3.4.2 Macro-level trends and technologies (VET systems and policies)

4. Globalisation, technology and skills needs

As noted above, technology and globalisation go together to deliver major shifts in skills needed in employment, not just in relation to technical skills needed for the digital and green transitions but also in the increasing demand for so-called 'soft' or 21st Century skills. At a macro level, there is a need to understand these trends better, so that VET systems can be tuned to deliver them. '**Big data**' systems continue to develop to support better skills anticipation, using techniques such as web scraping to analyse job advertisements, with AI poised to make these processes even more efficient.⁵⁷ An important corollary of this has been the development of **skills taxonomies**⁵⁸ at national (e.g., the US O*Net system) and supra-national levels (e.g., ESCO -European Skills and Competences for Occupations). Other technologies that

57. Section 10.2, *International Labour Organisation (2023) Towards lifelong learning and skills for the future of work: Global lessons from innovative apprenticeships*. https://www.ilo.org/skills/projects/adult/WCMS_872242/lang--en/index.htm

58. pp. 25-26, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308



are developing in this area include **online portals** to advertise VET courses and recruit learners and employers.⁵⁹ AI has the potential to improve further the process of matching supply and demand.

5. Open Educational Practices

Open educational resources emerged as an important part of the digital learning landscape in the 2000s,⁶⁰ to be joined later (especially after 2013)⁶¹ by massive open online courses (MOOCs). The creation and use of such resources can be collectively referred to as 'open educational practices' (OEP).⁶² OEPs make resources and courses available at no cost to whoever wishes to use them, whether teachers/trainers or learners. How far such resources are used within VET is difficult to gauge accurately, although millions of people globally make use of them every day. The burgeoning availability of OEP is both an opportunity and a threat. Though it makes learning more open, prominent issues of quality are raised – how do we know which resources are 'best,' and how is knowledge about them to be shared?

59. Section 3.2, *International Labour Organisation (2022) The digital transformation of apprenticeships: Emerging opportunities and barriers*. https://www.ilo.org/skills/projects/adult/WCMS_861712/lang--en/index.htm

60. UNESCO's 2002 Forum on Open Courseware coined the term OER, defining it as 'teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work'.

61. See www.class-central.com/report/moocs-stats-and-trends-2017

62. See section 4.3.1, ETF (2018) Digital skills and competence and digital and online learning. https://www.etf.europa.eu/sites/default/files/2018-10/DSC%20and%20DOL_0.pdf

There is a key role for government or intermediary agencies in these processes.⁶³

6. Development of blockchain and new forms of credentialisation

The growth in **micro-credentials** and **digital badges** in recent years is a response to several factors including the sharp increase in the pace of change in skills required in the workplace (necessitating the need for small units of learning to support upskilling, reskilling and side-skilling); the development of **blockchain** as a means of verifying and ensuring the security and reliability of credentials stored online; and for some sectors, like the technology sector, globalisation which has created a global labour market decoupled from national qualification systems.⁶⁴ Micro-credentials face the same quality issues as OEPs and also raise questions about if and how they ought to interface or be integrated into state-managed national qualification systems. They may also change the nature of how we understand the differences and relationships between formal, non-formal and informal learning. Micro-credentials could provide a more flexible, adaptable, and specific way for skills and competences accreditation in VET.

63. See Chapter 8, European Commission (2020). *Innovation and Digitalisation. A report of the ET 2020 Working Group on VET*.

64. Cedefop (2022). Microcredentials for labour market education and training: first look at mapping microcredentials in European labour-market-related education, training and learning: take-up, characteristics and functions. Luxembourg: Publications Office. Cedefop research paper, No 87. <http://data.europa.eu/doi/10.2801/351271>.

7. Managing new relationships between publicly and privately funded VET

Expansion in the use of technology is driving the evolution and growth of the 'edtech' market, with an increasing number and range of players developing and selling digital learning tools, materials, and systems as well as micro-credentials to the public sector, and indeed to individuals. This is changing the nature of the boundary between the publicly funded and privately funded spaces in VET.⁶⁵ Indeed, some sectors, like the globalised technology sector have for many years gone their own way completely. This suggests new partnership models would need to be found for the public sector to engage with private edtech providers.⁶⁶ Alternatively, we might see countries making bigger investments in the development of Digital Public Infrastructures and Digital Public Goods relevant to education and training.⁶⁷

Recent AI advances also raise the possibility that the most sophisticated and potentially transformative technologies based on learning analytics might come to be dominated by a few large players, although it is yet too early to judge, and another possible scenario is that open

foundational models will support a base of smaller product development companies.⁶⁸

3.4.3 Meso-level trends and technologies (school level management/companies)

8. More efficient and effective management of learners and teachers

Learning management systems (LMS) have been used to support the planning of lessons and curricula and the allocation of resources for decades. The latest advances in AI mean that it is becoming possible for digital learning to collect data not just on learners' progression and achievements but also on the **learning process** itself, which has been impossible before (unless in small-scale research).⁶⁹ This could provide feedback to school managers and teachers to help them better steer and organise learning. Increasingly sophisticated learning analytics could also help them to better identify and target learners at risk of leaving VET programmes early. Similarly, the ability of systems to handle and interpret increasing amounts of data provides a basis for more effective management of professional development for teachers/trainers. We should also not ignore the fact that, over time, technological advances have led to small scale solutions at school level for coordinating learning and sharing

65. McCoshan, A. (2021) Interaction of microcredentials with existing qualification and certification systems. Presentation at Cedefop Conference 'Microcredentials for labour market education and training', 25-26 November 2021.

66. See section 11.4, International Labour Organisation (2023) *Towards lifelong learning and skills for the future of work: Global lessons from innovative apprenticeships*. https://www.ilo.org/skills/projects/adult/WCMS_872242/lang--en/index.htm

67. Amiel, T. Open education and platformization: Critical perspectives for a new social contract in education. *Prospects* 54, 341–350 (2024). <https://doi.org/10.1007/s11125-023-09660-x>

68. p. 36, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308

69. P. 32, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308

resources which are accessible to both teachers and learners (e.g. compare the modern use of Microsoft Teams to the major investments required two or three decades ago in LMSs).

9. Improving engagement with employers, management of work-based learning (WBL)

Work-based learning is at the heart of VET but sourcing it and improving its coordination with the school-based element has always been a challenge for VET institutions. Digital advances offer opportunities to improve both aspects, handling **data on work placements** to better manage their allocation and also providing **cloud-based platforms** that enable teachers, learners, and companies to coordinate knowledge acquisition and practical learning better.⁷⁰ There is also the potential to integrate digital learning of ‘theory’ at the workplace. WBL itself seems to be comparatively under-provided for by digital learning technologies, reasons may include cost, a tradition of relying on company equipment (which, after all, is the rationale of WBL), and the fact that trainers often do not have a pedagogical background, meaning that facilitating blended learning or other forms of technology-based learning might be a challenge for them.

3.4.4 Micro-level trends and technologies (classroom/teaching practice)

10. Making VET more learner-centric

As noted in section 2, it is not inevitable that a new piece of learning technology leads to pedagogical changes, still less to a fundamental **shift towards more learner-centric methods**. Although it was an extreme case, the ‘emergency remote learning’ that was a response to the Covid-19 pandemic is a case in point.⁷¹ Nonetheless, digital learning can support many forms of pedagogy associated with the shift towards more learner-centric teaching and learning and help to develop skills needed in a changing workplace. For example: blended learning techniques such as the ‘flipped classroom’, where teachers set exploratory activities for learners to undertake before using the classroom subsequently as a venue for discussion, debate and analysis; social and collaborative learning, which is a key strength of modern technology with many possibilities through numerous platforms; experiential learning, such as video making and most recently simulations through VR and AR; and game-based learning, which is often a highly suitable form of pedagogy for some of VET’s client base, who prefer practical learning. New opportunities will also be opened up by the rapid advances in data-driven AI over the last decade which ‘have now introduced AI in educational settings [...] in unexpected ways. In particular, the recent easy access to generative AI tools

70. See section 10.6, International Labour Organisation (2023) *Towards lifelong learning and skills for the future of work: Global lessons from innovative apprenticeships*. https://www.ilo.org/skills/projects/adult/WCMS_872242/lang--en/index.htm

71. UNESCO (2023) *An ed-tech tragedy? Educational technologies and school closures in the time of COVID-19*.

has highlighted the potential of AI in education [...]⁷²

11. Personalisation of learning

Methods such as those just described are enabled by a vast and growing range of OEPs as well as proprietary commercial products. A significant challenge for educators lies in discerning which of these resources to choose to effectively meet their specific learning objectives. Nevertheless, increasing learner-centricity also involves taking approaches that are more systematic to the personalisation of learning such as through **intelligent tutoring systems and open learner models**. Such systems typically try to replicate the role of a teacher or a teaching assistant, generating learning activities and providing feedback, and enabling learners to track, reflect on, and pace their learning processes so they can learn more effectively.⁷³ Amongst the issues raised by such systems are how far they can effectively combine the complementary strengths of teachers and digital tools and of fellow learners (peers) in learning contexts; and how much support learners might require to self-reflect on their learning. Intelligent tutoring systems have been the focus of much research on AI in education where personalized learning has been supported by individualized sequencing and spacing of content to be mastered;⁷⁴ possibilities

for light-weight personalization using well-designed prompts and user interaction are also being opened up, which might be important in just-in-time learning and training.⁷⁵ In addition, AI can be used 'to generate meaningful interpretations of the learning experience that help the learner to understand learning [...] [and] to develop capabilities for learning [...] AI systems become 'intellectual companions,' 'learning partners,' and 'cognitive tools' that support the development of thought'.⁷⁶

12. Opening up new opportunities for practical (work-based) learning

Whilst **practical, experiential learning** should be a key part of VET, it can be difficult to deliver in practice. The availability of work placements can be limited, and many learners develop their practical skills in a combination of learning in real workplaces and in simulated work environments provided by VET institutions (such as beauty salons, engineering workshops or restaurants). AR, VR and MR have significant possibilities in some areas of VET, e.g. AR welding in which learners can repeat activities an unlimited number of times (because preparation and cleaning up tasks are not required) and safely, without risk to themselves or their tutors, making practical learning more

72. p. 35-36, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308

73. Hooshyar, D. et al (2020) <https://www.sciencedirect.com/science/article/abs/pii/S0360131520300774>

74. p. 35, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging

Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308

75. pp. 44, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308

76. p. 47, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308

widely available, efficient and effective. The next generation of XR, which is poised to offer more immersive experiences (e.g. through the holographic metaverse),⁷⁷ has the potential to replicate whole environments and not just individual tasks like welding, e.g. users could practice their 'front desk' hospitality skills in a simulated hotel reception area, interacting with avatar clients.

13. New forms of assessment

It is already well established that technology can open the **possibilities for assessment to become more learner centric**. For example, ePortfolios enable learners to document their learning in a wide variety of ways, using video clips, electronic diaries, etc. Recent developments in data processing and learning analytics offer potential innovations, provided that a range of conditions (e.g. in relation to institutional data processing capacity, interoperability, and data privacy requirements) can be met. For example, spray painting simulations generate data on the thickness and coverage of virtual paint applications to complement the experienced eye of a teacher/trainer. Applications have also been developed which can improve the links between assessors and learners, such as the TRIALOG app which enables learners, teachers and in-company trainers or mentors to exchange performance data or ask for support, e.g. over smartphones.⁷⁸

77. p. 21ff, Tuomi, I., Cachia, R. and Villar Onrubia, D., On the Futures of Technology in Education: Emerging Trends and Policy Implications, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/079734, JRC134308

78. p. 137 European Commission (2020). [Innovation and Digitalisation. A report of the ET 2020 Working Group on VET](#).

Although evidence on the effectiveness would be important, generative AI systems could be soon used as interactive learning companions that provide feedback to the learner.⁷⁹

4. EVIDENCE FROM ERASMUS+ PROJECTS

Having considered the nature of emerging trends and technologies in general in the preceding sections, we now turn to an examination of the picture amongst Erasmus+ projects, the European Union's programme to support education, training, youth, and sport in Europe. It supports actions and priorities defined in the European Education Area, the Digital Education Action Plan, and the European Skills Agenda.⁸⁰ This provides interesting insights into the state of play over the last decade in the development of digital technologies both through an analysis of data on technologies used and through exchanges with a panel of expert practitioners carefully selected from a sample of Erasmus+ projects (see Methodological Annex).

4.1 Trends and technologies in Erasmus+ Projects

The Erasmus+ database classifies projects according to field, one of which is VET, and topic, one of which is 'ICT – new technologies – digital

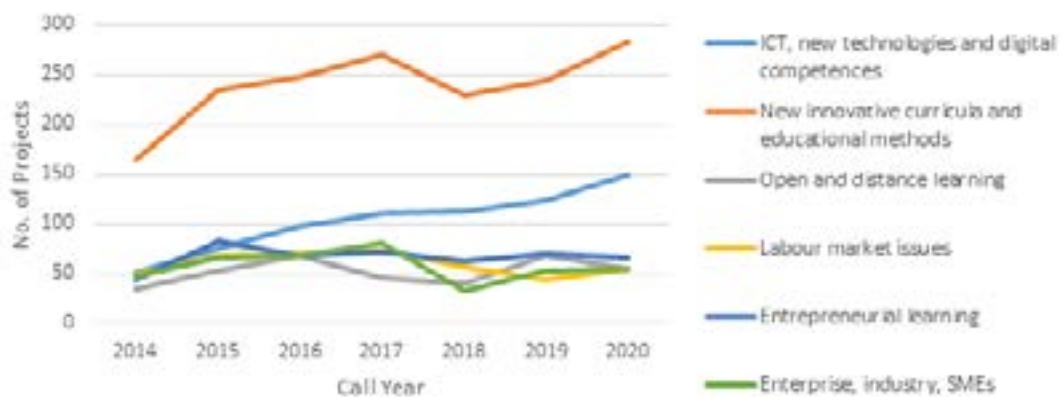
79. Sabzalieva, E., & Valentini, A. (2023). *ChatGPT and artificial intelligence in higher education: Quick start guide*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000385146>

80. [What is Erasmus+? | Erasmus+ \(europa.eu\)](#)

competences'. ICT projects over the period 2014 to 2020 accounted for 23% of all projects in Key Action 202: Strategic Partnerships for VET (722 out of 3,137 projects). Looking at trends over time, the ICT topic stands out for the fact that it is the only topic which steadily increased in terms of number of projects from 2014 to 2020 (Figure 7 shows the top six topics), revealing a steadily increasing interest in ICT and digital technologies and competences over time.

FIGURE 7.

Erasmus+ Key Action 202, 2014-2020: No. of Projects by Topic over Time.



Source: [Erasmus+ Database](#).

To analyse the data further, ICT projects were searched according to the number of sub-topics. Looking at the frequency of appearance of different sub-topics amongst ICT projects, the most popular terms have been fairly consistent throughout:⁸¹ online (more than 40% of projects since 2015), e-learning (on average, over the years, 36% of projects, but in a decreasing trend), and open educational resources (rising to over 20%) (Figure 8). Over time, there was a notable rise in the number of projects using the term online in 2018, whereas there was an uptick in use of the terms artificial intelligence, augmented reality, virtual reality, and learning management systems in 2019. Open educational

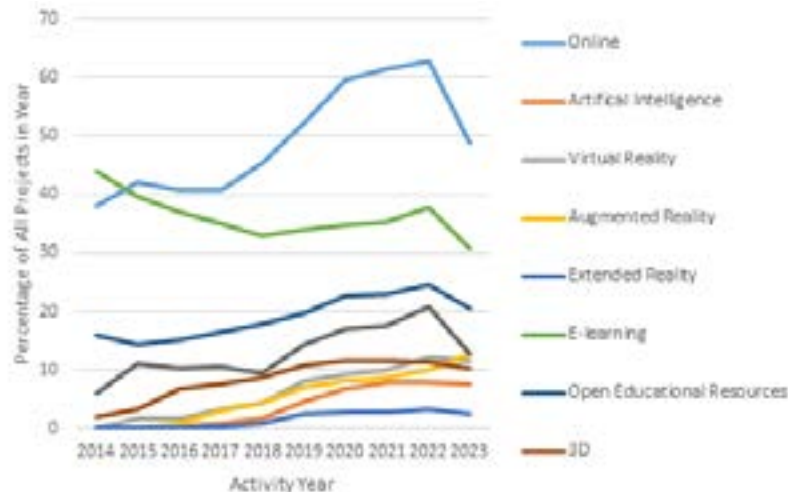
resources rose steadily from 2015 to 2022. In contrast, use of the term e-learning has tended to decline from the height of its popularity in 2014. In the last three years, between 8 and 12% of projects have used the terms AI, AR, VR, or 3D. **This means that around 1 in 10 projects has been working with or developing the most advanced technologies to apply in VET** to the extent that they are highlighted as a sub-topic.⁸² Such a small percentage might be anticipated given that, almost by definition, innovation is only ever undertaken by a minority of actors.

81. It should be noted that the Erasmus+ database information regarding topics is available for 'Activity Years'. An activity year shows the number of projects then active, and is therefore different to the number of projects actually funded in a Call Year since projects are typically multi-annual. Nonetheless, the data gives a good indication of the relative importance of different sub-topics.

82. Of course, advanced technologies might be being developed as part of other projects but we might reasonably assume that if they were central to a project they would emerge through a sub-topic search.

FIGURE 8.

Erasmus+ Key Action 202 ‘ICT, new technologies and digital competences’ Projects: Trends in Selected Sub-topics over Time.



Source: [Erasmus+ Database](#).

4.2 Involvement of EU Member States in terms of coordinators and partners

In terms of how participation in these projects is spread across EU Member States, the most salient countries in terms of having high numbers of both partners and coordinators are Germany, Spain, Poland and Italy, with France also notable as a country with a high number of coordinators and Romania with a high number of partner organisations (Figure 9). Germany and Spain particularly stand out for the number of times they are home to coordinating institutions (even allowing for their relatively large populations).

It is informative to see where these countries rank on the EC’s Digital Economy and Society Index (DESI) 2022. Whilst Poland, Bulgaria and Romania are in the bottom four on the Index, France and Germany are mid-table at 12th and 13th respectively, and Finland, Sweden and Spain rank 1st, 4th, and 7th respectively. It is not possible to draw conclusions from these data at

this level of aggregation, but one interpretation of this is that for coordinating institutions in some countries – Bulgaria, Romania, and Poland – participation might reflect a strong need to develop ICT in VET. In other cases, such as for Germany and France, which both have relatively strong VET systems, ICT in VET might be a means to take a step forward in VET provision in the face of perhaps surprisingly weak scores on DESI. In the case of countries like Spain, Finland, and Sweden, it would seem that participation could be a means of capitalising on a strong general digital base to enhance VET.

FIGURE 9.

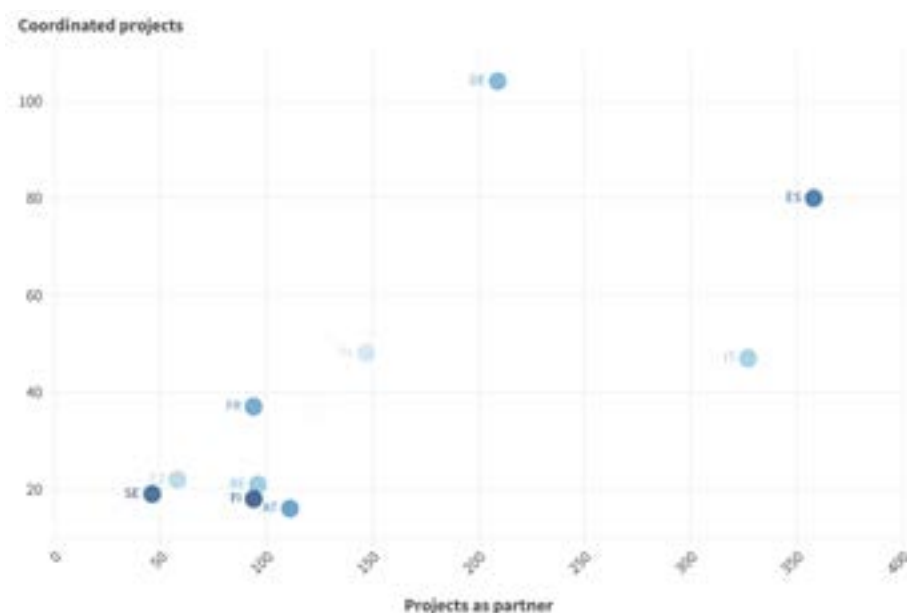
Number of Erasmus+ KA202 projects (2014-20): coordinating vs partner institutions per country. Top 10 ranked by number of coordinated projects in calls 2014-2020 inclusive.

Country	As coordinator	As partner	Rank on EC's Digital Economy and Society Index
Germany	104	209	13
Spain	80	358	7
Poland	48	147	24
Italy	47	327	18
France	37	94	12
Romania	36	126	27
Czechia	22	58	19
Belgium	21	96	16
Sweden	19	46	4
Bulgaria	18	95	26
Finland	18	94	1
Austria	16	111	10

Source: Erasmus+ Database; Digital Economy and Society Index 2022. <https://digital-strategy.ec.europa.eu/en/policies/desi>

FIGURE 10.

Number of Erasmus+ KA202 projects (2014-20): coordinating vs partner institutions per country. Shading of dots based on the ranking of each country on the EC's Digital Economy and Society Index. The darker the dot, the higher its position.



Source: Erasmus+ database.

4.3 Stakeholder involvement

Figure 11 shows the involvement of several types of stakeholders as coordinators across the 722 ICT projects. The top five types of stakeholders make up 69% of all the project coordinators, and the 'Other' category contains a truly diverse mixture of stakeholders, including research institutions and centres, social partners, local and regional public bodies, and social enterprises (none of which make up more than 4% of the total). Interestingly, vocational education and training institutions (at both secondary and tertiary level) make up only 29% of all coordinators.

Also noteworthy is the relatively significant role played by tertiary level institutions. Tertiary institutions in both higher education and

vocational education and training made up around one quarter of the project coordinators; and higher education institutions stand out in some aspects of more advanced technologies where they account for noticeably higher proportions of project coordinators dealing with artificial intelligence and augmented reality. Nevertheless, the numbers are small and therefore, care must be taken with interpretation.

Interestingly, both secondary level VET institutions and higher education institutions are more active as project coordinators in this ICT topic category than in the KA202 Action as a whole (where their shares are 17% and 13% respectively compared to 22% and 17% for ICT projects), whereas the involvement of tertiary level VET institutions is similar (6% versus 7%).

FIGURE 11.

Erasmus+ KA202 'ICT, new technologies and digital competences' 2014-2020 Call Years: Coordinators by Stakeholder Type, Number and Sub-topic.

Stakeholder	All	Online	AI	VR	AR	XR	E-learning	OER	3D	LMS
Secondary Level School/Institute/Educational Centre - Vocational Training	156	68	4	9	6	2	49	31	18	27
Higher Education Institute (Tertiary Level)	120	73	10	10	12	2	49	28	13	20
NGO/Association/social enterprise	91	50	3	8	4	3	31	17	6	11
SME	78	40	5	3	5	0	29	19	5	11
Tertiary Level School/Institute/Educational Centre - Vocational Training	54	30	1	5	7	3	13	5	6	5
Other	223	108	8	14	8	2	86	42	19	27
TOTAL	722	369	31	49	42	12	257	142	67	101

Source: Erasmus+ Database.

5. VIEWS OF EXPERT PRACTITIONERS

This section reports the findings from discussions and iterations with the panel of expert practitioners. Findings are presented in the form of a synthesis of key themes. Several iterations were followed to review and validate the findings. The panel was also requested to respond to additional questions so that some topics could be further explored.

First, the section examines the nature of digitalisation in VET, including what makes VET distinctive from other sectors of education. Second, it considers how the latest technological wave differs from previous waves. Third, it explores what emerging technologies mean for learners and educators. Fourth, it addresses the challenges of implementation, assessing the extent to which they have been exacerbated by these emerging technologies.

5.1 How should we understand digitalisation in VET?

Generalisation across VET is difficult because of the enormous variation in the extent to which digital technology is used across sectors, occupations, and national/local contexts. However, it was clear from the work done that VET is **far more exposed to digital changes than other parts of education** because of its proximity to digitalisation in the economy. As one expert said, ‘the sector [construction] is transforming rapidly, so VET needs to transform at the same rate.’

Another common observation from the discussions (included in this work) on **digital skills shortages** is the challenges that companies are facing in finding potential employees with the right skills to operate new digital equipment. Many interviewees mentioned this in the context of overall labour shortages caused by an ageing workforce. Not only the lack of digital skills is causing shortages, but also shortages themselves are contributing to the shift to using technology. For example, in the sector of construction, VET needs to deal with skills needed around robotics (in off-site prefabrication and then on-site assembly) and the use of ‘digital twins’ (a digital twin is a virtual representation synchronized with physical things, people, or processes). Large companies that are driving these changes simply cannot find enough workers with the required skills.

Overall, VET’s inherent connections to the labour market means that **digital learning in VET has two distinct but overlapping aspects** (which differentiates it from other parts of education):

- Using digital tools designed for e-learning (which tends to take place in VET institutions rather than during WBL, as it primarily consists of hands-on training).
- Learning to use the digital technologies used in industry.

This means that there are two routes through which digitalisation takes place in VET. Significantly, there was a consensus amongst experts **that changes in the workplace are currently the main drivers of digitalisation in VET**. A consequence of this is that often VET institutions are not digitally as advanced as the digital learning that takes place in work-based learning. In addition, technologies like AR and VR are bridging the gap between school-based and practical learning in terms of where it takes

place, since AR and VR can be used outside the workplace, increasing the options for learners to have workplace-like experiences whilst still in school (in a context where workplace simulations, e.g. through recreations of kitchens and commercial restaurants, are commonly a feature of school-based VET).

5.2 Are we experiencing a new wave of technology?

Experts agreed that **the latest technologies (e.g. 3D,⁸³ AR/VR, AI, and micro-credentials) are changing the path of digitalisation and accelerating their use in VET** because they reflect what is happening in industry. Digitalisation is becoming ubiquitous in economic activities, with companies increasingly purchasing robots, 3D equipment and smart glasses and needing employees with skills to use them immediately. For companies, digital tools (e.g. smart glasses in logistics warehouses) bring a variety of benefits: reduced human error; increased efficiency; better health and safety (especially in trades with potentially dangerous activities like construction); and reduced costs, amongst others.

From an educational/learning perspective, again it was noted that **the latest technologies constitute a turn in the road for VET** because of the higher level of interactivity they bring compared to technologies used 10-15 years ago. One expert talked of the latest technologies being ‘exponentially’ more powerful for training and for use in work tasks. As regards the pace of change, experts varied in their responses, some identifying a gentle uptick in the existing curve, and others talking about a

‘revolution.’ Looking forward, the experts tended to agree that a wide range of changes will take place at school and classroom levels in the next 5-10 years, e.g. more individualised learning, use of more data analytics in assessment and school management. However, there was more scepticism that changes would occur at national level because of the inherent caution of public institutions.

The experts identified a **range of benefits** that the latest technologies offer, namely:

- More engaging learning experiences for learners (they have a motivating factor)
- Enable learning in experiential ways (‘a 3D model is worth a million words’)
- Can be a means of expressing creativity, e.g. through 3D printing
- Allow practical experiences which mimic industrial experiences
- Make training possible through practical simulations where previously it was either difficult or impossible because it would have been too dangerous
- Make learning more efficient, bringing an added value for learners
- Enable learners to complete tasks on their own, which previously would have required supervision by teachers.

Furthermore, the panel highlighted that technologies bring benefits from an inclusion perspective, becoming **increasingly helpful for learners with special needs** because of the straightforward ways in which they can be adapted. Technology also means language is increasingly less of a barrier to learning, since, for example, VR/AR headsets can have language settings. This can be a major help to, for example, migrant communities and their integration into the labour market through VET. Indeed, by opening VET as a possibility to more people with language and other needs that require adaptive technologies, digital tools help

83. In this report, 3D is taken to mean both earlier forms of 3D design and modelling technology (from which more advanced 3D forms like AR and VR have evolved) and 3D printing.

not only with inclusion, but also with general labour shortages.

Within these broad general trends, the consulted experts highlighted some key **differences between technologies**. Broadly, three groups can be distinguished: 3D; AR/VR; and AI.

- In general, **3D technologies** were described as past the ‘hype cycle’ and already an established part of VET, having, in the words of one expert, ‘proven their value in VET for creating hands-on learning experiences’. However, the picture is variable. 3D printing has become commonplace, with one expert describing ‘a boom effect in 3D printing machines due to their low price and fact that anyone can buy them and [use them] from home’; whereas, sometimes 3D applications can be more complex than AR and VR, require special hardware, can be more costly and require the development of educator expertise.
- **AR and VR** are becoming well established in some sectors, and in simulation settings whilst still experimental in others. AR can be easiest to implement, whilst VR is somewhat more expensive (in terms of cost, maintenance and to design courses using VR), but the take-up of both may be constrained by the cost of equipment, the need for substantial teacher training, and the integration into existing curricula – and, as the panel expert stated, ‘effective integration of these technologies into VET requires a paradigm shift in teaching methodologies, which might take longer to achieve across the board’, and depends on ‘low-threshold content creation to serve pedagogical needs’ which might be facilitated by ‘stronger integration with AI (content creation by AI with voice

prompt for real-time creation or access to object database and subsequent real-time rendering, positioning and interactivity, when using glasses, e.g. ‘create me a machine x with ...’).

- **Artificial intelligence** is seen as having enormous potential for personalised learning and analytics with an important level of interest from teachers. Further, these potentials mean AI could become a continuous support to learning, unlike VR, AR, or 3D, which are less likely to be used every day. However, there are substantial unknowns, along with ethical and legal concerns. Teachers are struggling to know how to use AI effectively. Moreover, as one expert put it, it is ‘scarier for people sometimes because it is harder to look under the hood and understand it.’ Indeed, the complexity of AI and its rapid pace of development means teachers will need support to develop the capabilities to use it effectively in educational contexts, which may slow down its rollout. AI has the potential to become a tool in curriculum development and content creation. Meanwhile learners (young learners especially) are already using ChatGPT (instead of established search engines) which may (further) change their learning habits (see next section).

In sum, 3D technologies are now past the ‘hype cycle’ and are an established part of VET but can be more complex than AR and VR and require special hardware and can be more costly.

AR and VR are becoming well established in some sectors, whilst still experimental in others. AR can be easiest to implement, whilst VR is more expensive (in terms of cost, maintenance and to design courses using VR).

As for AI, its potential benefits and challenges are currently unclear. There is an important level of interest from teachers, but they are struggling to know how to use it effectively. At the same time, whilst much depends on learning goals and accessibility, it is unlikely that VR, AR, and 3D are used every day, whilst AI has the potential to be used as a continuous support to learn, e.g., through its link to learning analytics and ability to tailor learning to individual needs.

Along with these three types of technology, blockchain (including **micro-credentials**) also warrant attention. Micro-credentials are seen as being potentially useful because of their flexibility and labour market relevance, and their use could become more widespread if AI is used in content creation. However, key to their uptake will be recognition of their utility by employers and the VET community as well as their alignment with industry standards and recognition through national state qualification systems so that they have value in the labour market. This may take some time.

5.3 What does new technology mean for learners in VET?

It was striking that most experts, without prompting, pointed to the emergence of a growing gap between the digital life experiences of young people and their experiences in VET (indeed, in most cases it was the first point experts made). In short, there is an **increasingly sharp contrast between the comparatively constrained school digital environment (where restrictions on the purchase and use of technology often exist) and the relatively unconstrained digital world the learners live in**. Most experts agreed that there would be increasing divergence between these two worlds in the next years. As one expert stated, 'VET

is running very much behind. It will cost time to keep up [with] the pace.' Young people were described by participants in the current study as 'digital natives',⁸⁴ with different expectations and being motivated by different drivers than older adults already in the workforce. One expert commented that in recent decades, every generation has had access to more digital tools and young people are now 'addicted' to the digital world. Another commented, 'Young people are digital natives so the (industrial) sector and VET has to be attractive to them.' Still another went further, noting that young people seem to be less concerned about the need to get on a career pathway than previous generations, and are more likely to quit a job they are unhappy with than to persevere. In contrast, some experts drew attention to the fears and challenges some **older workers** have around reskilling to be able to use innovative technologies.

Digitalisation is **raising questions about both what and how we should learn**. Young people typically use more advanced technology for entertainment at home than for learning in school and much of their learning takes place through social media (including social media influencers).⁸⁵ The panel expert commented that young people are habituated to learning in a fast way and are not motivated by traditional (text-based) ways of learning. New technologies like AR/VR are regarded as motivating for young

84. It should also be noted that some authorities doubt the validity of this term, e.g. OECD/Rebecca Eynon (2020), 'The myth of the digital native: Why it persists and the harm it inflicts', in Burns, T. and F. Gottschalk (eds.), *Education in the Digital Age: Healthy and Happy Children*, OECD Publishing, Paris, <https://doi.org/10.1787/2dac420b-en>; and Selwyn, N. (2009), 'The digital native – myth and reality', *Aslib Proceedings*, Vol. 61 No. 4, pp. 364-379. <https://doi.org/10.1108/00012530910973776>

85. At the same time, it should be noted that empirical research has long shown that there are other factors more important than age when it comes to digital competence.

learners; smart glasses are ‘cool’ for many young people. The latest technologies are also raising critical questions about what we need to learn. Knowledge is instantly available, and rote learning is becoming redundant since mobile phones/ the internet provides information instantly. Having said that, issues of variable and unequal digital access (see further below) remain a critical issue to consider.

At the same time, although young people are characterised as ‘digital natives’ by many experts, they remarked that **the ability of young people to use technology to best effect in learning can be limited**. As one expert put it, ‘their ability to leverage these tools for learning effectively can vary based on their prior exposure to technology in educational settings and the level of digital literacy skills they have developed.’ Another commented that a key factor at work here is weak digital capacity amongst teachers who lack sufficient knowledge to instruct students in how to use technology smartly or correctly. As another expert put it: ‘Digital native means sometimes able to use, e.g. AR lenses in Snapchat, but critical reflections of use might be missing. This media competence provision is the goal of the VET teacher/trainer.’

The panel expert also pointed to **likely increases in inequalities in access to and skills to use digital technologies**, notwithstanding young people’s generally higher levels of proficiency in using them. Indeed, of all the issues these experts were asked to comment on in terms of how things might develop in the next years, the strongest views were registered on this issue: most experts strongly agreed that the latest wave of technologies would increase inequalities between learners. The experts commented: ‘VET cannot do everything’ but equally ‘parents cannot pay for everything for their children,’ which increases

the likelihood of inequalities increasing; and learners need ‘proper support’ on how to access knowledge online rather than just getting information from the internet which seems attractive to them.

5.4 What does new technology mean for teachers and trainers in VET?

Discussions revealed that, depending on the context provided by individual countries and schools, **teachers’ attitudes and skills vary** across the spectrum from, on the one hand: teachers with negative attitudes, little experience of using digital tools and a reluctance to reskill, to on the other hand: what we might regard as ‘expert practitioners’ (a category that includes the experts themselves) using technology to make innovations in pedagogy, with all ‘colours’ of the spectrum in between. Furthermore, whilst there is now a higher proportion of teachers with digital experience compared to ten years ago, those experiences may have been both positive and negative, with the emergency remote learning of the pandemic contributing both types of experience.

Moreover, **the pace of current changes is increasing the difficulty of keeping up to date** so that, whilst experience may accumulate it can suddenly become outdated. One expert described the situation in their country in this way: ‘Teachers ... try to obtain some digital tools, for example, smart glasses for AR/VR but then, often lack proper education on how to use it. Eventually, they learn themselves and seek for answers if they might have any technical difficulties ... It is often a time hurry situation in which they receive some money

and acquire digital tools (smart glasses or 3D printing machine etc.) and then, hurry to present and pass some knowledge to learners without their proper education. In general, teachers are not equipped adequately with proper knowledge on usage.' As noted above, the main driver of digitalisation in VET is the workplace, and one expert noted that 'without continual professional development and partnerships with industry, teachers may not stay abreast of the latest tools and techniques used in the workplace.'

The panel expert reported a **range of effects when teachers embrace technology**:

- There is greater personalisation of learning in which learners can work at their own pace, and which makes it possible to have students spanning a larger age range
- Personalisation enables teachers to move from being instructors to moderators of learning, providing more tailored support to those learners who need it most
- More learner-centredness is balanced by the greater collaboration that is possible with the latest technologies which capitalises on the nature of learning as a social process, and which also makes for more efficient and effective learning
- Rather than learning being broken down into smaller and smaller elements (or 'cannibalised' as one expert called it) it actually becomes more complex; rather than delivering 'lectures', teachers make video tutorials that learners can access at any time (one expert noted that they were experimenting with AI-enabled avatars for teachers), giving them more time for individualised work with students, visiting businesses, etc. – in one case teachers no longer have fixed timetables.
- The interactive nature of the latest technology makes it possible to change

the relationship between teaching and assessment because of the instant feedback functions built into AR and VR.

Overall, the expert highlighted that the latest technologies are **increasing the need to better understand the role of the teacher in a digitally connected world**. This is especially true with the rise of AI. Many teachers fear (understandably) that their job is no longer important because of technology, although, as one expert pointed out, teaching and learning as social processes require a competent teacher/trainer now more than ever, one who can act like a conductor, selecting and integrating different educational technologies like instruments in an orchestra. Whilst the 'solution' to the 'challenge' of technology was seen in various ways (e.g. a 'harmonious blending' of old and new teaching methods, or always making sure to ask first what the pedagogical benefits will be), as one expert underlined, technology also challenges you to reflect on the core of teaching: is teaching about knowledge transfer or exploration and shifting the emphasis to asking what the (right) questions should be rather than what the answers are? In sum, it is crucial to support VET institutions to deal with emerging trends in general, such as generative AI, by providing them with clear recommendations and guidelines in the topic.

5.5 Are the challenges to implementation familiar but becoming more acute?

Whilst technologies may be new, the panel agreed that we face the same challenges we have had for the last three to four decades. Indeed, as one expert put it, they are the same obstacles that we faced with the mobile phone or even the earliest computer technologies. However, crucially, **none of the constraints**

is reducing in significance and some are becoming more problematic, as least in the short run:

- **Speed of and hype related to technological change:** The rapidity of technological change and the existence of ‘hype cycles’ have long been a challenge for adopting technologies into education; but the rate of change is increasing, making it harder for VET to keep up. AR/VR have developed rapidly and one of the well-known issues related to AI is that the technology itself is involved in the creation and recreation of modern technologies, with an exponential rate of change and growth in, for example, the number of apps. Aware of the risk of hype, and the speed of change, many experts reported that their strategy is to ‘stay behind the curve’ so that they avoid the risk of investing time and resources in technologies that fail to deliver on their initial ‘promise.’
- **Investment:** Companies are quicker to adopt recent technologies, and the VET system needs to be able to invest to keep up with industry needs. The availability of funding was seen by some experts as the greatest problem and is now a deeper problem because the technology is more expensive. Funding is a challenge for purchasing hardware and licences and for technological innovation and scaling up.
- **Teacher competences and attitudes:** The panel expert noted the importance of teachers being able to see the benefits of technology for teaching and learning and having their fears addressed. In some countries, the teaching population is ageing and many teachers ‘lack knowledge of even simpler technologies’. Notwithstanding that countries run digital

upskilling programmes for teachers, there is still resistance to change amongst many educators. Dialogue is required to demonstrate to teachers that technology may enhance their pedagogy. Technology needs to support teachers in their role, not compete with it. Teachers need to be able to know where and when to use technology most effectively (as one expert noted, AR and VR are unlikely to be used every day). Some experts noted that teachers need time more than training, and that this is an especially principal factor if they are to create content/training resources. Another expert noted that their preference was for ‘no-code’ or ‘low-code’ solutions (such as smart glasses whose software supports easy-to-use content creation) because they are ‘low threshold’ for users, i.e. they make it easier to create content and to scale up. In the short run, we are likely to see more AI use and content creation. In the end, it should become easier to write content based on AI.

- **Problems with infrastructure:** Previous waves of digital technologies have run into infrastructure issues, and the current wave is no exception: a key infrastructural constraint of the latest wave is access to the Cloud. Stable and consistent 4G or 5G internet connectivity and/or strong Wi-Fi are essential requirements. It was noted that too many VET providers still lack access to the requisite infrastructure. Moreover, accessibility problems at home (either weak infrastructure coverage and/or the inability of learners and parents to afford hardware and software) limit teaching possibilities since teachers need all students to have the same access, e.g. to introduce the ‘flipped classroom.’
- **Engaging with private Edtech providers:** Intricately linked to the issue of funding

and investment, some scepticism and caution were expressed around engaging with private digital providers (although the Edtech market was not mentioned spontaneously in any discussion). A range of issues were identified including: i) risks associated with the cost of hardware/software and becoming locked in to a technology because of a lengthy multi-year contract or because it becomes too costly (time, money, re-training needed) to change it; ii) messy and complex situations linked to obtaining licences (e.g. the inability to obtain licences because of the status of an organisation or because they could not be funded by educational or Erasmus+ budgets); and iii) issues around who will own products that are co-created with teachers.

- **Lack of flexibility and slow pace of change on qualifications and programmes:** This continues to be an issue and is more acute in a context where the pace of change in industry is increasing. Qualifications and programmes were quite widely criticised for being ‘too rigid’ and often failing to keep up with changes (e.g., one expert cited a digital communications course that still taught about landline telephones). To tackle this issue, many teachers find workarounds and teach students what they will need in the workplace on top of what is specified in formal curricula.

6. CONCLUSIONS AND RECOMMENDATIONS

Based on the evidence presented in the preceding sections, the following conclusions and policy recommendations have been developed. Overall, emerging technologies are bringing to the fore some long-standing issues, as well as raising new ones, that need to be tackled to ensure VET systems are relevant to the needs of contemporary societies in the EU.

6.1 Similar obstacles to change as in previous waves of innovation

We face the same obstacles to change as with previous waves of innovation. Despite three to four decades in which several types of digital tools have been introduced, it is striking that there continues to be resistance to change, a need to equip teachers with the skills they need, inadequate funding and infrastructure, insufficient flexibilities within qualifications and programmes, etc. The apparent difficulties of VET systems to deal with these issues now poses a greater risk of falling further behind employers’ technological advancements, especially with the rapid acceleration of change in industry. To use a metaphor contributed by one of the experts participating in the study, VET needs to get on board the ‘technology train,’ but the train is moving faster, although VET systems have been made a big effort already. It is legitimate to ask whether necessary reforms have been carried out to establish a digital foundation that can support further developments and thus how well-

equipped VET is for the coming years. Teachers are willing but they need the VET system to support them.

- **Recommendation 1:** It is important to make a major upgrade in support for digitalisation that can rapidly build a platform to make the most of the latest wave of technology. This means making significant investments in teacher education as well as software and hardware, probably at levels beyond those we have seen so far. Without them, VET will continue to fall behind.

6.2 Technological innovation in VET requires research and collaboration

Bringing about technological innovation in VET seems to require organisations that can function as intermediaries at the intersection of technological research and innovation, employers, and the VET system. It is informative that many of the expert practitioners participating in the current study are in such organisations, e.g. in a Centre of Vocational Excellence, a technical centre, an Inter-company Training Centre, or a research centre. They bring together multiple stakeholders from diverse backgrounds who work on a project basis, in contrast to the daily administrative focus of mainstream VET systems. Erasmus+ performs a similar function and was praised by several experts for enabling experimentation with technology and piloting new activities in schools. Interestingly, one expert commented that it had been necessary to pilot Erasmus+ activities outside school hours and the mainstream curriculum, which offered less flexibility for innovations. What these sorts of organisations also have in common is that they are linked to but also positioned outside their

mainstream VET systems. This suggests that innovation within VET systems is difficult and may point to why obstacles appear to endure over the decades.

- **Recommendation 2:** The major investment noted in Policy Recommendation 1 needs to include the funding of bodies that can function as intermediaries between technology and VET, that bring together research, innovation, and teaching practice. The establishment of such intermediaries will likely enable a rapid and more effective digitalisation of the VET sector.

6.3 Widening gap between the digital worlds outside and inside VET

There is a widening gap between the digital worlds outside and inside VET, which may continue to grow without significant interventions. This particularly affects young people whose general digital experiences are increasingly different to those they experience in VET. Emerging technologies are beginning to close this divide, yet there must be a broader evaluation of the skills young people require in an era of technological disruption, as illustrated for instance by digital assistants that are becoming increasingly sophisticated. Additionally, it is crucial to consider the ways VET students ought to learn and will likely learn within the developing digital landscape that is being shaped by emerging technologies. This problem is not unprecedented—we have long discussed the ‘over-reliance’ on technology. However, the advent of emerging technologies, particularly artificial intelligence, may be sharpening the focus on this issue and bringing it to a critical juncture. In response to the challenges posed by technology in education,

some countries have taken measures such as prohibiting personal devices during compulsory education phases or retracting digital learning policies.

However, these strategies, even if they were to prove effective, are hardly viable within VET due to the older age of the students and the integral component of WBL. As one expert remarked, ‘technology is surpassing us now and we need to find the right level for it [in VET].’

- **Recommendation 3:** It is imperative that we start to close the gap between the digital worlds inside and outside VET and that we build a better understanding of how technology is affecting learning processes, especially for young people. Further research in these areas is needed to allow adequate policy action to be designed.

6.4 Understanding the relationship between teachers and technology

It is becoming more important to understand the relationship between teachers, their teaching and technology. Again, this is not a new issue: digital upskilling of teachers has been an issue since the first learning technologies were introduced and continues to be so, but how far the wider question of teachers’ role has been addressed is open to debate. While it seems to have been addressed in piecemeal fashion before, now it is the time for a wider dialogue and debate on the issue of teachers’ role in the context of AI especially. Emerging technologies also are blurring the boundary between VET institutions and the work-based part of VET by decoupling practical skills training from the workplace (e.g., through VR/AR, which can be used in VET institutions for practical training). This too will have repercussions for teachers. It

is time to consider what a VET institution of the (near) future might or should look like.

- **Recommendation 4:** Whilst VET has been subject to several technological waves over the last three to four decades, the latest technologies seem to be qualitatively and quantitatively different in terms of their potential impacts on the relationships between teachers and learners. Yet, much of VET still conforms to teaching and learning models created in the nineteenth and early twentieth centuries to meet the mass-production needs of the industrial revolution, little affected so far by digitalisation in the wider world (with some notable exceptions or ‘islands of excellence’). Policymakers urgently need to consider the potential ramifications of AI, and how VET might need to adapt both to realise its potential benefits and determine likely challenges and how to address them.

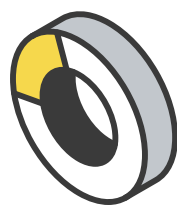
6.5 Understanding the relationship between teachers and technology

Though this issue has come up repeatedly in discussions about digitalisation over decades, it is evident that inequalities have not been removed and notably got worse during the Covid-19 pandemic. A nuanced approach to future investments in digital tools and infrastructures is therefore needed to tackle the lack of resources and competences of disadvantaged groups within the population at large. Even where young people are perceived by VET teachers to be ‘digital natives,’ we cannot assume that they are able to use digital devices effectively for learning or work purposes. It is therefore vital to ensure that teachers are equipped with the capabilities to teach learners how to use digital learning

tools for those purposes. Digital skills will likely become more important in the labour market soon and not equipping all learners with such skills will sharpen wider social and economic divides.

- **Recommendation 5:** Further digitalisation in VET and in workplaces threatens to exacerbate inequalities in society according to levels of digital skills. There should be a strong focus in policy and funding for those who need most support for the development of digital skills, in terms of access to technology itself, both to hardware and software, and to high quality teaching. ■





PART III: CASE STUDIES

Small pilots of SELFIE WBL in different VET systems via case studies

As it has been mentioned before, in this line of research, four different small pilots of SELFIE WBL and VET systems case studies were carried out in Albania, Austria, Spain and The Netherlands. SELFIE WBL is the SELFIE module of work-based learning. It is important to underline that, in each country, the process followed was adapted to the national and regional context, to better analyse the integration and potential value of SELFIE WBL in these environments.

These four cases are mainly focused on analysing how SELFIE WBL is used to reflect on the use of technology in the training system, both at the VET institution and in the company contexts. In more detail, the four case studies in alphabetical order:

- **Albania**

The case study is contextualised in the Albanian Tourism VET sector, which is one of the main priorities of the country and many initiatives are being implemented to support the development of the VET sector and with an emerging WBL modality.

- **Austria**

This case focuses on exploring which role SELFIE WBL can play in a very specific situation: the discussion process with companies in terms of skills demand and offer. In Austria, the Institut für Bildungsforschung der Wirtschaft – ibw Austria (an institution set up by the Austrian Federal Economic Chamber and the Federation of Austrian Industries) oversees the analysis of the relation between education and training, skill

needs of business and qualifications.

This institution has a remarkably close relation with companies, so based on fluent communication and discussion with companies, IBW defines the profiles and qualification for the occupations to be worked in the WBL.

- **Spain – Basque Country**

The case study is contextualised in the Basque Country region in Spain, with one of the most developed VET systems in Europe. It can provide relevant information about the specific use, but also some insights about the Basque Country VET system, as a forerunner in VET with a very-well developed VET sector, to potentially identify insights that can serve as a basis or reference to other regions and countries.

- **The Netherlands**

The case study contextualised in The Netherlands is a good opportunity to analyse the use of SELFIE WBL in the country's two-way-model for VET: school-based (80% of the learning takes place at school and 20% at companies) and work-based (80% of the learning at companies and 20% at schools). This case study could provide relevant information about the potential use and role of the tool in this context but also, about potential differences between school-based model and work-based model.

Chapter 3.

Case study in Austria

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ABSTRACT

The rapid digitalisation of the professional world and labour markets presents two main changes: the increasing digitalisation of traditional job profiles and the creation of completely new ones. In response, Austrian apprenticeship training systems, characterised by the dual model of Vocational Education and Training (VET), are adapting through continuous updates of training regulations and close monitoring of labour market trends. This model combines work-based learning with theoretical education in part-time vocational training institutions and has a good reputation for its effectiveness. Key indicators, such as low youth unemployment rates and high satisfaction among apprentices and training companies, underline the success of the system.

This study highlights the proactive approach of the Austrian dual VET system towards digitalisation, which includes numerous initiatives and policies to ensure its relevance in today's digital economy. Recent adaptations of apprenticeship schemes reflect the evolving demands of digital technologies, with new programmes initiated in IT sectors. Challenges remain, especially for training companies, as digitisation affects different economic sectors differently, especially in technical areas such as engineering and IT.

The evaluation of SELFIE WBL, a digital self-reflection tool, proved its value in identifying digital competences and strategies in dual VET. Interviews with stakeholders, including representatives of part-time VET institutions and leaders of training companies, revealed positive feedback on SELFIE WBL's ease of use, its comprehensive content, and its potential to enhance digital strategies. The tool supports self-reflection and identification of the use of digital technology in learning environments, although it may need to be adapted for the development of specific competences in IT curricula.

In addition, the COVID-19 pandemic acted as a catalyst for digital learning tools in Austrian apprenticeship, marking a possible change in basic assumptions. Despite increasing digital integration, manual learning programmes continue to emphasise practical training. The exploration of digital solutions such as augmented and virtual reality could further transform training methods, effectively simulating professional experiences outside traditional workplaces.

In conclusion, Austria's dual VET system is solidly positioned to meet the challenges and opportunities presented by digitalisation. Tools such as SELFIE WBL support this transition, providing information on current digital practices and guiding future curriculum development to meet the demands of a digital labour market.

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1. INTRODUCTION

The dual VET system in Austria is a well-established and quite efficiently working system of initial vocational education and training based on a wide acceptance by young people, companies, and society in general. As it is also a very dynamic system constantly undergoing changes and adaptations it is confronted with different challenges and issues regarding the process of digitalisation.

In Austria there are currently a lot of initiatives and policies in action to tackle these challenges within the educational sector. The dual apprenticeship system faces challenges because a lot of the apprenticeship occupations are based on a hands-on-approach and therefore the use of digital learning technologies is not always easy to implement. There is also a sort of 'hierarchical' gap between over 200 apprenticeship schemes in relation to the amount of usage of digital technologies. Some occupational fields are remarkably high tech whereas other professions only require a bare minimum of digital technologies and knowledge and are therefore not intrinsically digitally inclined.

The purpose of this chapter is twofold: first we will take stock of the current situation within the Austrian dual VET system and the topic of digitalisation. What are the challenges? What are the perspectives and specific issues of learners and training companies? What measures have been taken to address the aspects of digitalisation in apprenticeship training? Are there institutional shortcomings? To shed light on these questions we will use a wide range of data and studies. Furthermore, we will describe the Austrian dual VET system, its functionality, and the underlying success factors.

In a second analytical step – and based on the previous analysis – this chapter tries to assess

the potential and the usefulness of SELFIE WBL within the Austrian dual VET system. This will allow embedding SELFIE WBL in the existing dual training structures and can show the role this tool can play regarding the Austrian strategy of dealing with the challenges presented by the digital transformation within dual VET. The role of SELFIE WBL will be examined from two perspectives: can SELFIE WBL be used by part-time-vocational schools and training companies to identify strengths and potential weaknesses of the respective institution regarding digitalisation? Furthermore, we will look on whether SELFIE WBL can play a supportive role in the process of developing new dual VET curricula respectively adapting existing curricula. Is it possible to use SELFIE WBL in creating transversal and/or specific digital skills for the Austrian dual VET system? All these questions will be tackled, and final conclusions and recommendations will be derived.

1.1 Austrian dual VET System

Like Germany and Switzerland, in Austria the so-called dual system is a well-established model of providing young people who have completed nine years of compulsory schooling with initial vocational training. It combines practice-oriented training with the imparting of specialist theoretical knowledge and key skills and is usually organized in two different learning places: the 'Berufsschule' (part-time vocational school) and the training company.⁸⁶

86. In the construction industry for example there is a trial model: In addition to training in the company and at vocational school, a third part of the training takes place at the so-called 'Bauakademien' (construction academies). In these supra-company training institutions the apprentices learn and deepen their practical skills in 2-3 weeks per apprenticeship year and are prepared for practical work on the construction site. This basic training is rounded off with a comprehensive range of seminars on safety, physical fitness, personal development and social skills.

About 80 percent of the training time is spent in the training company and one or two days a week the apprentices visit the vocational school for the specialist theoretical part of learning.

An apprenticeship can last from two to four years depending on the chosen type of apprenticeship and ends with the final apprenticeship examination ('Lehrabschlussprüfung'). This certificate is recognised nationwide and highly regarded by employers as a high-quality school-leaving qualification. Entering a dual apprenticeship is an extremely popular educational pathway amongst young people in Austria: around 40% of all 15-year-olds⁸⁷ opt for an apprenticeship every year, although regional differences exist. In the year 2022 for example the amount of all 15-year-olds entering an apprenticeship varied between around 33 percent (Burgenland) and 48 percent (Upper Austria). Apprentices receive a 'Lehrlingseinkommen' (apprenticeship remuneration) with its minimum rate being defined in the relevant collective agreement. This remuneration increases with every year of training.

In the final year of apprenticeship training, it will reach about 80 percent of a corresponding skilled worker's wage.

On a federal level the relevant legal legislation is laid down in the Vocational Training Act ('Berufsausbildungsgesetz'), which lies within the responsibility of the Federal Ministry of Labour and Economy (see also Table 1). The provisions regarding the organisation of vocational schools and the basic curriculum provisions are set out in the federal School Organisation Act ('Schulorganisationsgesetz'). The Federal Ministry of Education, Science

and Research is responsible for the framework curriculum for vocational schools for each apprenticeship and 50 percent of the salaries for teaching staff in vocational schools are financed by federal funds (the other 50 percent are provided on the federal state level). The training regulations for individual apprenticeships are issued by the Ministry of Labour and Economy based on a report from the Federal Advisory Board on Apprenticeship.

BOX 9.

FACT BOX VOCATIONAL TRAINING ACT

The Vocational Training Act:

- forms the legal basis for the different apprenticeships and their development
- regulates the company-based part of apprenticeship training
- contains all the rights and obligations of apprentices and in-company trainers
- governs the final apprenticeship examinations
- regulates the recognition of vocational training completed abroad
- regulates the qualification of trainers
- regulates integrative vocational training and supra-company vocational training, which does not take place in a training company but in a training facility
- defines subsidies, support services and additional offers for apprentices and training companies

Source: Federal Ministry of Labour and Economy 2022

According to the Vocational Training Act, the Federal Ministry of Labour and Economic Affairs must submit a report to the National Council every two years on the current situation of youth employment and apprenticeship training in Austria. This chapter contains a comprehensive statistical analysis as well as an

87. Indicator 'Proportion of apprentices in their first year of training among all 15-year-olds'

overview of existing measures and their effects on dual training with recommendations for further developments.

At the federal state level there are nine apprenticeship offices anchored within the regional chambers of commerce. These apprenticeship offices - together with representatives of the chambers of labour - determine the suitability of the training companies in terms of material and personnel facilities and are responsible for auditing and recording the apprenticeship contracts. They are taking care of all issues regarding the interests of the apprentice and the training companies and provide comprehensive counselling in this regard. The chairs of the apprenticeship examination commissions are to be appointed by the head of the apprenticeship offices based on a proposal received from the Federal State Advisory Board on Apprenticeship. The apprenticeship offices also handle the final apprenticeship examinations and funding for training companies.

Looking at the labour market status shortly after the end of training illustrates the direct career entry of apprentices (compared to other training paths): 18 months after apprenticeship completion, 77 percent of apprenticeship graduates from the 2017/18 graduation year were employed. Only 5 percent were (still or

again) in training. Regarding other education and training pathways, the proportion of people in employment at this time was below 50 percent. In comparison, only 44 percent of graduates of three-year full-time school VET programs have been employed 18 months after finishing their educational pathway.

To ensure permeability to higher education and training there is the possibility for apprentices to take 'vocational' matriculation examinations (Berufsmatura) free of charge since the year 2008. Participants may take three of the four component examinations (German, Living Foreign Language, Mathematics and Special Discipline, i.e. the training field of the candidate) while still in apprenticeship training (i.e. before taking their apprenticeship examination) and the last component examination after their 19th birthday. Preparatory courses are open to apprentices as of the first year of training in all apprenticed trades. After successfully passing the vocational matriculation examination, candidates have unrestricted access to study programmes of Austrian universities and universities of applied sciences, post-secondary colleges and other Austrian training establishments requiring matriculation examinations for enrolment.

TABLE 1.
Framework conditions and characteristics of dual apprenticeship training in Austria.

Aspects	
Entry requirements	Completion of nine years of compulsory schooling
Legal basis	Vocational Training Act
Assessment of suitability of training companies	Assessment notice from the apprenticeship office (chambers of commerce) in cooperation with the Chamber of Labour
Legal basis	Improve Digital Competences of VET Teachers and Trainers (IDC-VET)
Company ↔ Apprentice	Apprenticeship contract

Aspects	
Institutions responsible: Federal level	Federal Ministry of Labour and Economy issues training regulations (in-company training part)
	Federal Ministry of Education, Science and Research (school-based part of training)
	Federal Advisory Board on Apprenticeship
Institutions responsible: Federal state level	Apprenticeship offices (Chambers of Commerce)
	Regional Advisory Board on Apprenticeship
	Education directorate
	Federal governors
Duration of training	2 to 4 years
Number of apprenticeships	225
Places of learning	Company, vocational school
Proportion of vocational school lessons in total training	Around 20 percent, 1 to 2 days per week (2 half days) or blocked
Financing of in-company training	Companies (around $\frac{3}{4}$ of the total training costs), supported by public funding
Completion of training	Final apprenticeship examination at the end of training with theoretical and practical exams
Content of exam	Written assignments (oriented towards company practice), practical work, technical discussions
Recognition of prior school achievements	Omission of the theoretical examination in the case of a positive vocational school leaving certificate
Examination jurisdiction	Apprenticeship offices
Ensuring permeability	'Vocational' matriculation examination ('Berufsmatura')
Apprenticeship starters with upper secondary school leaving exam	2.8 percent (2020/21)
Initiative for reforms/reorganisation	Affected sectors, social partners, ministries
Development of new training regulations	Educational research institutes; expert opinion of the Federal Advisory Board on apprenticeship for the Ministry of Labour and Economy
Development of new framework curricula	Expert group under the direction of the Ministry of Education, Science and Research

Source: Federal Ministry of Labour and Economy 2022.

1.2 Functionality and success of the Austrian dual VET system

Looking at and assessing the functionality of an educational system there must be two different points of view. The first question is: *does* the system work and what kind of empirical data is

suitable to show the functionality? The second question is: *why* does a certain model work within the institutional framework? What are the defining factors and the key anchor points assuring the success of a certain form of education and training? The following sections respectively deal with these two aspects of evaluation.

1.2.1 Does the Austrian dual VET system work?

Generally speaking, the dual VET system is a very dynamic system and is constantly reshaped in terms of content. Training regulations are being adapted to new developments and new skill demands on the labour markets and additionally new apprenticeships are being developed if necessary. This enables the education system to flexibly respond to the current requirements of the business and working world and to offer training as required.

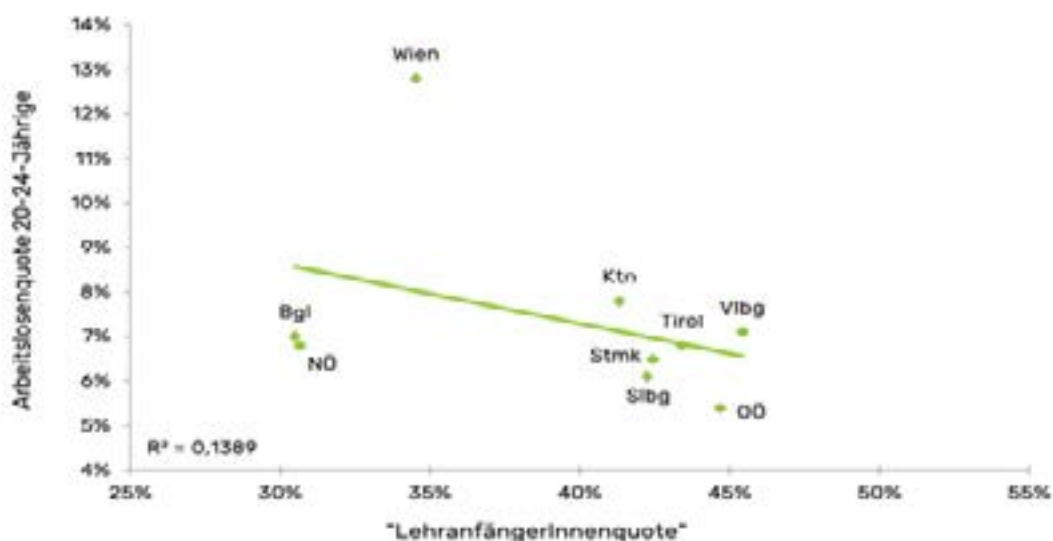
There are several indicators and arguments that underline the functionality of the dual system empirically. On the one hand there are the numbers regarding youth unemployment: comparing the unemployment rates of young people between the age of 15 and 24 within the European Union show significant differences between countries with a dual VET system and countries that rely on different educational paths to provide initial vocational education

and training to young people. Statistical data from 2022 display a youth unemployment rate in Austria of 9.5 percent, the Euro Area (20 countries) average is amounting to 14.6 percent. There are only very few other countries displaying a lower rate regarding this indicator than Austria. In Finland for example the corresponding number lies at 14.2 percent, in Sweden at 21.7 percent. In southern European countries the numbers are even higher.

But even within Austria there is a clear and statistically significant indication that the rate of young people entering an apprenticeship training scheme is correlating with the level of youth unemployment rates (see Figure 12). In federal states like Burgenland or Lower Austria where there are lesser entry rates into apprenticeship, the youth unemployment rate is significantly higher than in federal states like Upper Austria or Vorarlberg. While the corresponding correlation coefficient is not particularly high with a value of 0.14, it is obviously still of statistical significance.

FIGURE 12.

Rate of young people entering an apprenticeship (x-axis) and unemployment rate of 20-24 old.

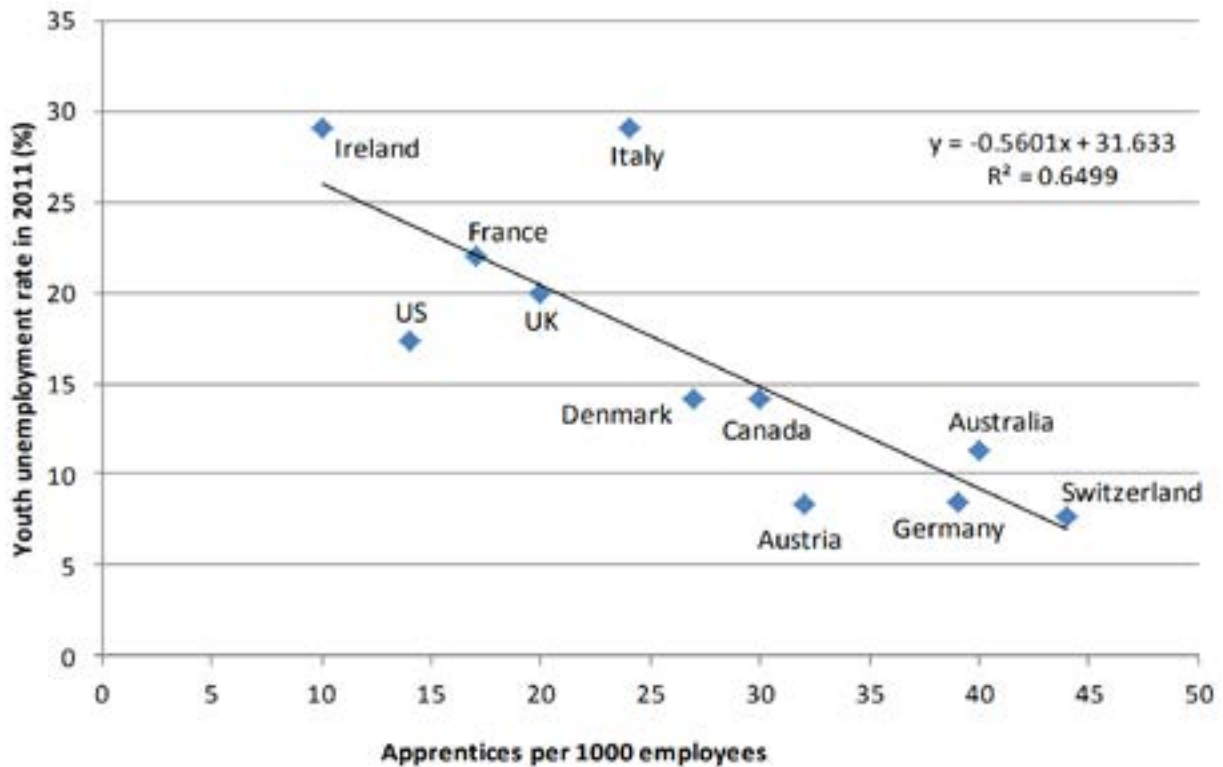


Source: <https://www.qualitaet-lehre.at/lehrlingsausbildung/lehrlingsausbildung-in-oesterreich/zahlen-und-fakten-zur-lehre/>

These results are supported by numerous other national and international studies and publications. The International Labour Organisation for example presented the following figure in a paper published in the year 2019. This figure quite clearly depicts that

countries with a well-developed and functionally embedded apprenticeship system like Austria, Germany and Switzerland show a far lesser amount of unemployment rates within young people.

FIGURE 13.
Prevalence of apprenticeships and youth unemployment.



Source: International Labour Organisation 2019.

In reflecting on the quality of the dual VET training scheme there are two main participants to consider: the apprentices themselves and the training companies. Only when both parties are clearly satisfied with the institutional framework and the output of the system, this kind of VET training can perform well.

A recently conducted study shows the benefits of the Austrian apprenticeship system from the viewpoint of the training companies. This study shows that the average net income for a training company is negative (even when basic

funding is considered). But a central motive for training apprentices in the long term is to train skilled workers according to the needs of the training companies. Significant returns only arise after the training of apprentices in the form of savings through the hiring of self-trained skilled workers compared to the recruitment of skilled workers on the external labour market. The following table demonstrates this cost-effectiveness of apprenticeship training.

TABLE 2.

Recruitment costs of companies active in training and not active in training per newly recruited skilled worker (mean values in Euros).

Dimensions of costs	Companies active in training		Companies not active in training	
	Absolute	Relative	Absolute	Relative
Application process				
Costs of advertising	560	5%	501	3%
Effort of application process	1.031	10%	931	6%
External consultancy	201	2%	455	3%
Costs of induction				
Reduced performance during induction period	5.072	49%	9.405	62%
Effort of introduction by employees	2.915	28%	2.977	19%
Training courses	618	6%	1.010	7%
Total recruitment costs	10.398	100%	15.279	100%
n	329		69	

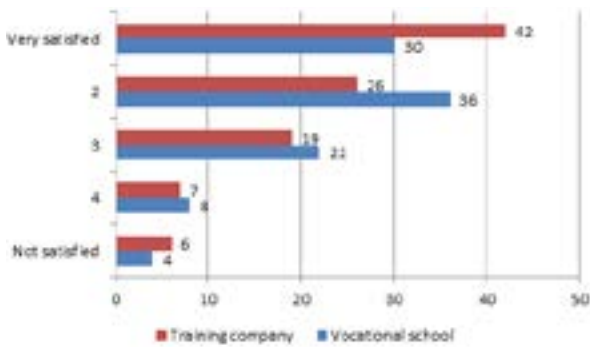
Source: Schlögl/Mayerl 2016.

In 2021 there has been a survey conducted in Austria comprising more than 4.000 apprentices called 'Österreichischer Lehrlingsmonitor' (Austrian Apprenticeship Monitor). This survey is carried out periodically and was established in the year 2015. It provides information on training satisfaction and training success from the perspective of the apprentices. The results generated show the high extent of satisfaction of the young people who have chosen this kind of education and training path. A third of the respondents were able to realize their original desired occupation. For a further 40 percent, the realized apprenticeship was one of several interesting professions that were considered when deciding on a career. By contrast, the proportion of apprentices for whom the chosen apprenticeship was only an emergency solution

because they were unable to find another training place is relatively low (five percent).

42 percent of apprentices are very satisfied with the training conditions in the company and 30 percent with the training conditions at the vocational school (see the following figure). Since the first Austrian Apprenticeship Monitor was carried out in 2015 the proportion of those very satisfied with the training conditions has risen continuously both regarding the company and the part-time vocational school. The results concerning the quality of the training also paint a clear picture: asked whether the apprentices 'feel like well-trained skilled workers' 72 percent of the respondents answered with 'Totally agree' or 'Rather agree'. Only three percent of the young apprentices answered with 'Don't agree.'

FIGURE 14.
Satisfaction of apprentices with the training conditions.



Source: Lachmayr/Mayerl 2021.

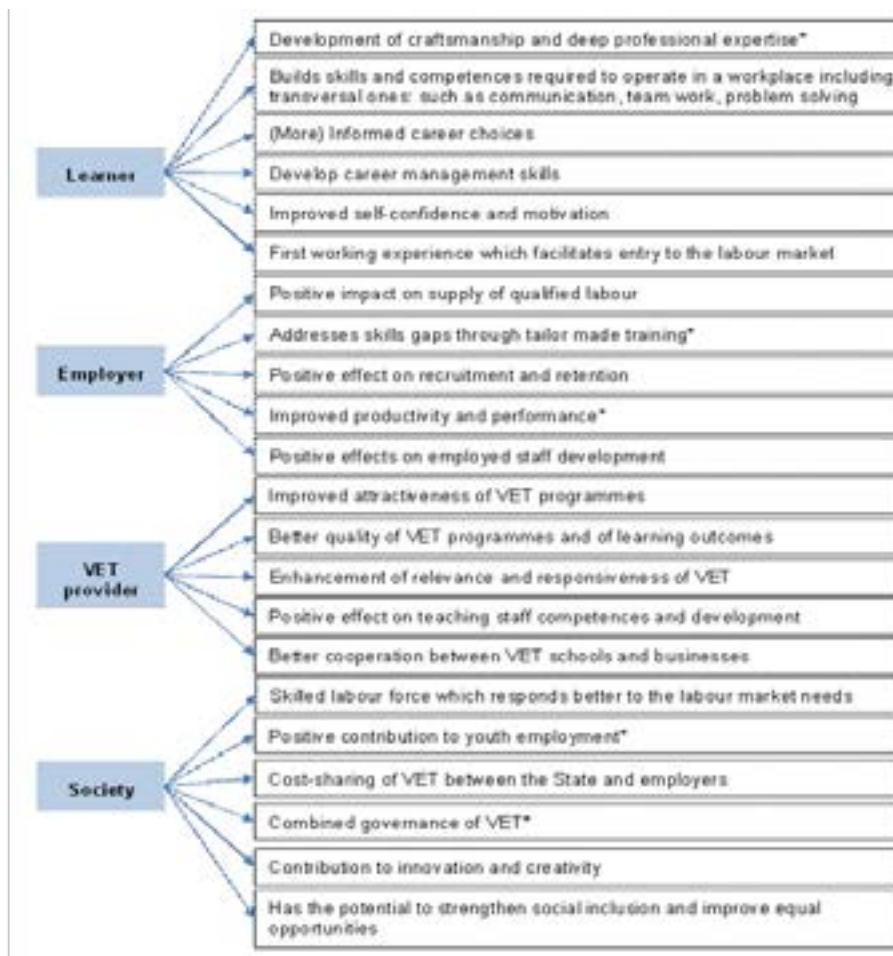
Considering the data presented here, it can be assumed that apprenticeship training is obviously valued as a solid and valuable training route by all people and institutions involved: The young people themselves, the training

companies, and the relevant political and economic stakeholders.

1.2.2 Success factors of dual VET

There are many international studies dealing with the necessary institutional and administrative framework for implementing a successful dual VET system. A relevant chapter by the European Commission for example summarises the benefits of job-related education and training programmes for the relevant groups involved (learners, employers, VET providers and society in general) – regardless of the actual form they take (apprenticeships, work placements, etc.) – as follows:

FIGURE 15.
Different areas of benefits in establishing work-based learning environments.

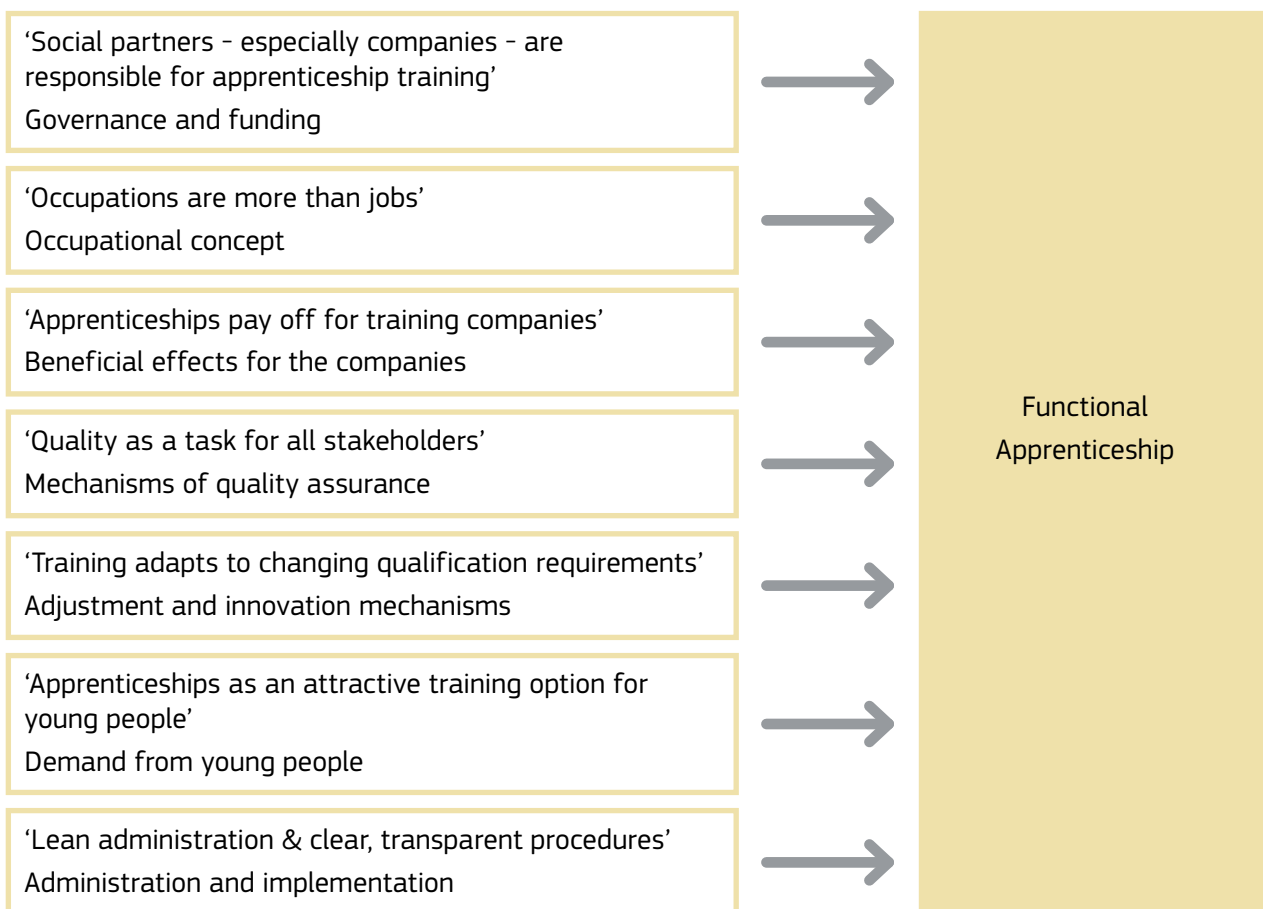


Source: European Commission 2013.

It is common sense in the research community that to establish apprenticeship systems successfully there are several crucial factors and framework conditions to consider. Figure 16 presents the necessary institutional and administrative pillars of a fully functional dual apprenticeship system as can be seen established in Austria. The inclusiveness of such a system is certainly one of the most crucial points in developing and implementing a durable dual VET model. In Austria, the prerequisite for this is based on the system of social partnership and the constant dialogue and exchange between all relevant stakeholders associated with this educational model.

A practical system of governance, efficient administrative structures and mechanisms for quality assurance and innovation are just as much a part of this, as well as young people who are interested and motivated in training. However, the core elements of apprenticeship training are the companies that are willing to act as training organisations. Even if many companies in established apprenticeship training systems emphasise their social commitment in training young people, the business benefit calculation is usually a legitimate goal as well.

FIGURE 16.
Core content dimensions for the sustainable implementation of a dual apprenticeship system – Austrian model.



2. INSTITUTIONAL STRATEGIES AND CHALLENGES

2.1 Initiatives regarding digitalization in the Austrian education system

In order to make digital skills visible and to be able to classify them according to development stages, from 2018 to 2022 the Federal Ministry for Digital and Economic Affairs created a digital skills model 'DigComp 2.2 AT' for Austria. The European DigComp 2.1 reference framework served as the basis for this model. Building on this, strengths and weaknesses can be identified. Meanwhile there is an updated version 'DigComp 2.3 AT.' The goals of the digital skills campaign are that:

- as many people as possible in Austria have basic digital skills by 2030,
- to increase the proportion of IT specialists and especially female IT specialists and promote digital talent to meet the economy's need for skilled workers,
- to make digital skills measurable and comparable with the introduction of a national reference framework.

Part of this national digital strategy is the association 'fit4internet', a non-partisan and independent initiative to qualify and quantify the digital skills of the Austrian population. Its primary goal is to enable the competent use of digital technologies and the broad participation of society in digitalization. 'fit4internet' works in close cooperation with many different institutions, stakeholders and with companies.

In Austria there is a plethora of initiatives and policies regarding the challenges of digital

change within the school and education sector. The Federal Ministry for Education, Science and Research for example has started a comprehensive campaign to approach the Digitalization of the Austrian school system. Overall aim is to build digital skills meaning learning with digital media, learning about digital media, and creating a basic understanding of how the digital world works.

This initiative contains eight sections of content:

- Portal Digital School: Aims to bundle existing applications to provide teachers, learners, and parents with consolidated and clear information in an easy-to-use format and to support them in several ways in everyday school life.
- Standardized communication processes: Recommendation to reduce the learning management and communication systems to one solution per location. The distance learning service portal provides support for standardizing the systems.
- Distance Learning MOOC: As part of a Massive Open Online Course (MOOC), teachers are prepared for teaching in blended and distance learning settings using information and communication technologies.
- Eduthek: As a digital content platform, the Eduthek provides in-depth practice materials for all types of schools and subjects. The Eduthek bundles content offerings using a standardized catalogue system and makes them available to teachers and learners.
- Seal of quality for learning apps: Aims to evaluate and certify apps for mobile learning and for use in blended and distance learning. The seal of approval is intended to provide parents, teachers and learners with guidance and assistance in selecting innovative products that are already on the market.
- Expansion of the basic IT infrastructure at all schools: This basic IT infrastructure

includes a broadband connection based on fibre optics at the respective school location as well as a powerful and sufficient WLAN supply in the individual classrooms.

- Digital devices for pupils: The 'Digital Learning' device initiative equips pupils in the 5th grade at participating schools with a notebook or tablet.
- Digital devices for teachers: As part of the device initiative for pupils, a certain number of devices were made available to teachers in the participating digital classes. This ensures that there are enough devices at the school for teachers to use in their classes.

Furthermore, there is a 'Master plan for digitalization in education' which started in the year 2018 and contains three thematic areas:

- Field of action 1 'Software' - pedagogy, teaching and learning content: as part of a fundamental revision of existing curricula, new teaching and learning content from the field of digitalization is to be systematically incorporated into the curricula. The aim is to reflect a comprehensive basic understanding of how to deal with updated content in the curricula.
- Field of action 2 'Hardware' - infrastructure, modern IT management, and modern school administration: the infrastructural equipment and the availability of mobile devices are to be brought up to a uniform and comparable standard. The prerequisite for the use of digital instruments and tools in schools is to be created across the board.
- Field of action 3 'Teachers' - training and further education: digitalization, new ways of conveying content and ways of acquiring it should be systematically anchored in the training and further education of teachers.

These initiatives are just a few examples of the many reforms and strategies within the school systems going on regarding digitalization and the many impacts these digital changes entail.

2.2 Initiatives and agendas within the dual VET system

2.2.1 Contents of training regulations and new professions

Besides the aforementioned policy activities regarding the school system in general, there have been quite a few initiatives specifically targeting the dual VET sector. In the year 2020 for example there was a so called 'Lehrberufspaket' installed: this package consists of 31 new or upgraded dual VET occupations within the commercial and administrative business sector. The reason given for this was the fact that the old training regulations did 'no longer correspond to modern office organisation with the current requirements, especially with regard to the digitalization of the office sector'.⁸⁸ Therefore, content from the field of digitalization was significantly incorporated into all new job profiles.

This actualization of training schemes was followed by another adaptation in the year 2022 with five training regulations being updated. Again, the motivation lying behind this was also linked to the requirements in relation to the process of digitalization: 'Many apprenticeships no longer correspond to the current economic or technical conditions in operational practice. In addition, digitalisation and changes in the world of work are opening up new occupational fields that are not covered by the apprenticeships currently available.'⁸⁹

88. <https://www.bmaw.gv.at/Themen/Lehre-und-Berufsausbildung/Lehrlingsausbildung-Duales-System/LehrberufelnOesterreich/Lehrberufspakete-2015-bis-2022.html#lehrberufspaket-1-2020-0-6>

89. Federal Ministry of Labour and Economy 2022

Also in 2022, the training regulations in the professions plastics process engineering and carpentry (technology) were modernized. In addition to the respective specialist skills, the interdisciplinary skills areas 'Working in a business and professional environment', 'Quality-oriented, safe and sustainable work' and 'Digital work' were included.

Since 2015, in total more than two dozen new apprenticeships have been created and the training regulations for around 100 apprenticeships have been revised and modernized. The most important reason for this is digitalization. Besides adapting existing training schemes four new training curricula specialising in the field of digital applications and developments have been implemented:

- E-Commerce-Trading (326 apprentices 2022)
- Application development/coding (716 apprentices 2022)
- IT-Operational technology (255 apprentices 2022)
- IT-System technology (1.756 apprentices 2022)

In the year 2016 the Federal Ministry for Digital and Economic Affairs commissioned a wide ranging occupational profile screening ('Berufsbild-Screening') in which the existing training regulations for all apprenticeships were examined to determine whether they meet the current requirements of the labour market and the professional world.⁹⁰ As part of this research project a quantitative content analysis was carried out developing a competence model for transversal competences. These transversal skills also include those digital skills that are to be taught across all professions as part of apprenticeship training. In addition, job-specific digital skills are playing an increasingly

significant role within apprenticeship training.

Furthermore a 'Competence model for the digitalisation of vocational education and training' was developed consisting of six areas of competence:

- User skills (operational, technical, and formal)
- Information and data-related competences
- Digital communication skills
- Development and design skills (creation of content and applications)
- Strategic competences and interdisciplinarity
- Transversal key competences

Based on this analytical model all apprenticeship training schemes were scanned in relation to the digital skills required within a profession and the number of digital skills actually included within the respective training schemes.

2.2.2 Training companies and the challenges of digital transformation

A recent study allows us to take a closer look at the extent of the challenges for training companies in relation to the process of digitalization.⁹¹ To this end, in total about 1.100 training companies participated in an online survey. One of the survey items dealt with increasing requirements within apprenticeship training due to digitalisation. Looking at the total figures without considering the respective industry, only about 15 percent of the training companies agreed that such increasing requirements are highly relevant from their point of view. To give a comparison: the statement 'There are not enough good/qualified candidates applying for an apprenticeship' was a pressing issue for over 40 percent of participating training

90. Dornmayr et. al. 2019a

91. Dornmayr et. al. 2019b

companies and therefore almost three times as important within the training agenda.

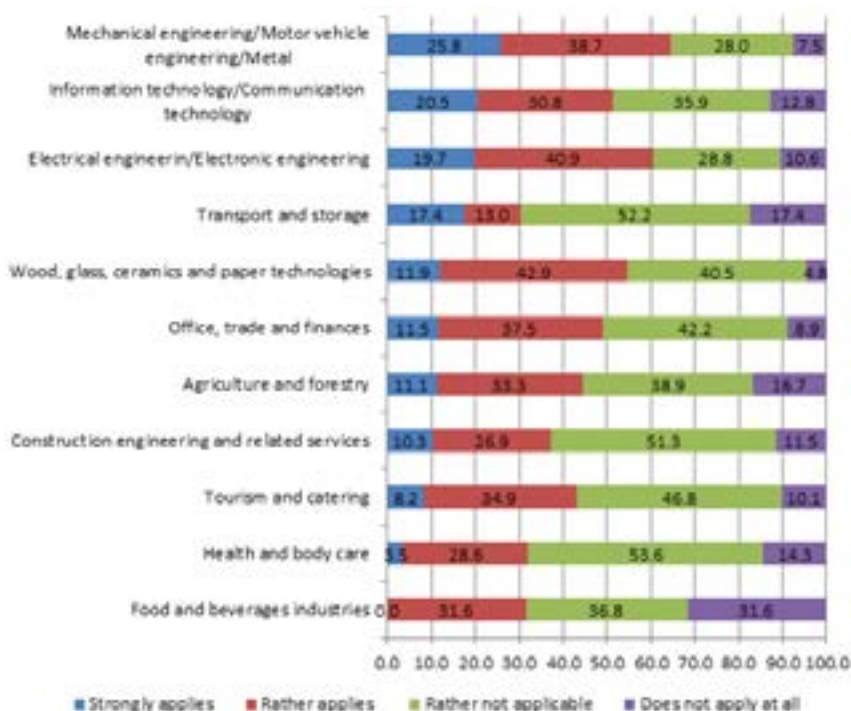
However, this whole issue can only be accurately assessed if it is differentiated by economic sectors. Figure 17 presents the item relating to the increasing requirements of apprenticeship training due to digitalisation. The data shows the big gap between the different occupational areas quite clearly: about a fourth of the training companies in the highly technical oriented sector ‘Mechanical engineering/Motor vehicle engineering/Metal’ are confronted with challenges regarding their VET activities and the digital transformation whereas in the area ‘Tourism and catering’ for example there were respectively only about eight percent of training companies who have reported similar big challenges. These empirical results emphasise the exceedingly different digital requirements in the different apprenticeship training regulations and occupational fields. A related study from Germany produced comparable results: the

report in question concludes that digital forms of learning were not used in the hospitality sectors whereas apprenticeship training in the industries quite frequently is making use of digital devices and media.⁹² Obviously there exists a digital gap between the various economic sectors and industries regarding apprenticeship training.

This is also important regarding the implementation of SELFIE WBL within the Austrian dual VET system. The relevant question in this context is this: can one singular instrument like SELFIE WBL cover the vastly different digital needs and requirements of the over 200 apprenticeship training regulations? Or must such a tool be able to differentiate to take these different starting points into consideration? We will discuss this topic in detail in the following sections presenting the qualitative results because we think that this is a crucial point in relation to the implementation process of SELFIE WBL.

92. Biebeler/Schreiber 2020

FIGURE 17. Increasing requirements in the apprenticeship training (e.g. due to digitalisation) by occupational group (in percent).



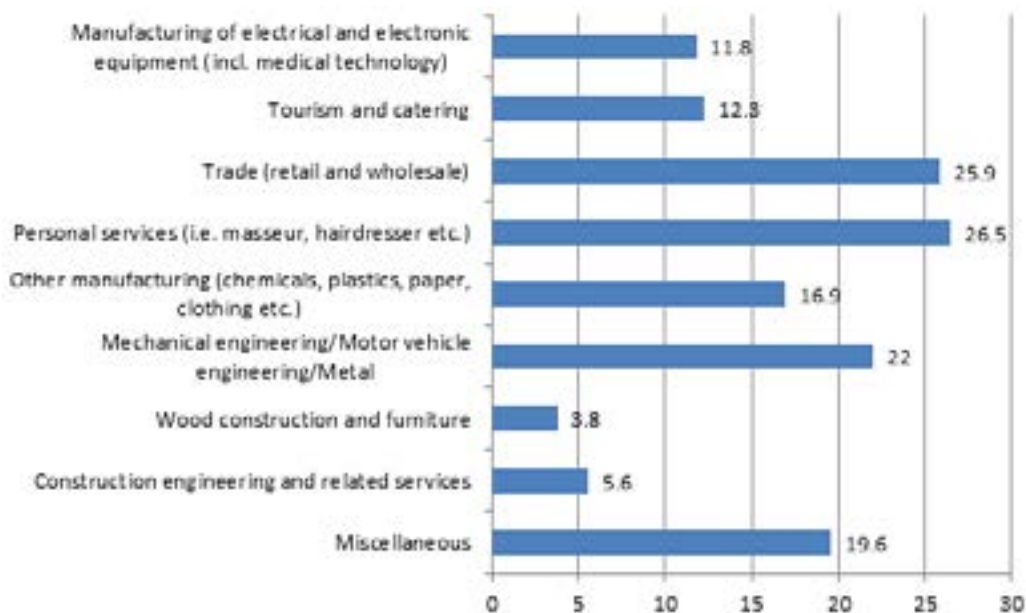
Source: Dornmayr et. al. 2019b.

Another interesting finding of the study used here relates to the amount of digital learning technologies in dual VET in Austria. Asked with the question ‘What elements/methods do you use in the training of apprentices in your company?’ only around 17 percent of the designated VET trainers stated that they used digital learning technologies like learning apps, learning software, simulations, etc. The authors of the study therefore draw the conclusion that there is still a lot of potential for further development. But this finding must be viewed against the backdrop of the date of the survey: it was conducted in the year 2019 and therefore before the Pandemic. The events surrounding the outbreak of the Corona virus of course inevitably changed a lot in relation to the use

of distance learning and the use of digital technology in education and training in general.

The study concludes that with roughly 17 percent only a comparatively small number of vocational trainers in Austria currently utilise the use of digital learning technologies. According to the authors the relatively low usage of digital learning technologies indicates that there is still enormous potential for the development and application of general and occupation-specific learning tools. Figure 18 presents these results differentiated by economic sector. The data illustrates the significant differences in relation to the economic area of training.

FIGURE 18.
Proportion of vocational trainers who use digital learning technologies, by economic sector (in percent).



Source: Dornmayr et. al. 2019b.

In some industries special initiatives are already being taken. Within the construction apprenticeship pro-programmes for example, the focus in future will be on e-learning. A wide range of digital learning methods are used.

Since 2019, learning videos, online training and knowledge checks are offered on an internet platform to prepare the young learners for the final apprenticeship examination. In addition, every apprentice gets a free tablet

in the second year of their apprenticeship training. The tablets have internet access and pre-installed e-learning programmes as well as other applications relating to topics like occupational safety, construction site documentation, environmentally friendly disposal, etc. All this is free of charge. The device can be used at school and construction sites and can be integrated into the IT structure of the training company.

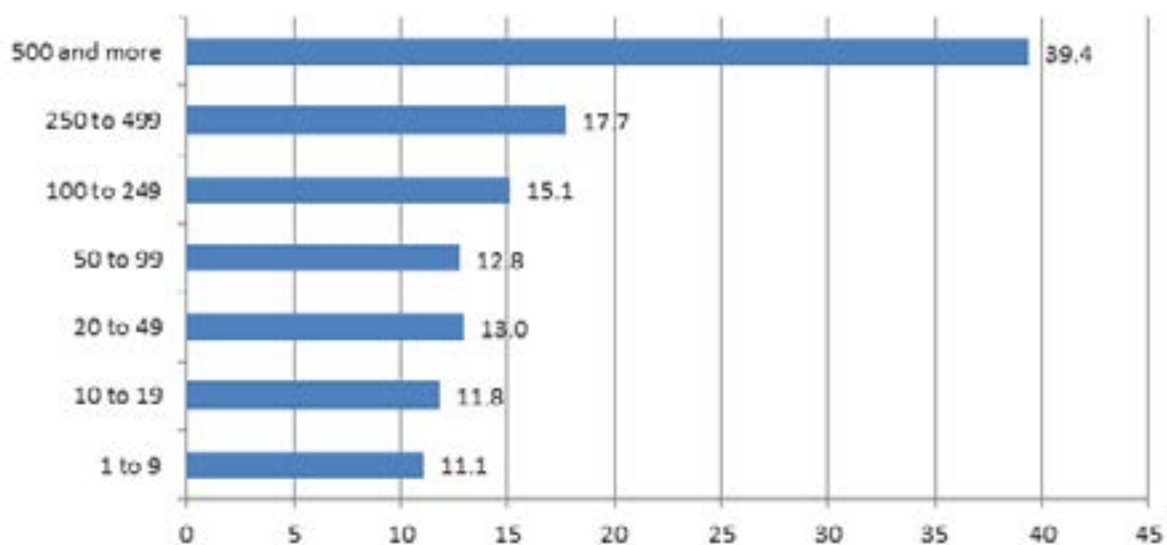
The impact of the pandemic on the dual VET sector is examined in more detail in section six of this chapter. This impact was quite strong and changed the use of digital tools in the apprenticeship system. There have been a few studies carried out regarding this topic. Initial results show that digital tools were only actively used by VET trainers in a small number of companies before the pandemic. However, this changed during the lockdowns: trainers

too started to use messenger services, video conferencing, tools for collaborative learning or digital exam preparation.

Looking at economic questions and the various challenges companies face; the factor of business size always must be taken into consideration. Especially for small companies' problems may occur in teaching basic digital skills because of limited resources. The following figure illustrates this aspect of analysis. In the ongoing discussion therefore other learning venues and training options are recommended for small and medium enterprises. This may consist of ready-made e-learning elements of platforms that can be accessed by smaller training companies for free or at low and easily affordable costs. On the other hand, vocational training and adult education institutions also offer training programmes and courses regarding basic digital skills.

FIGURE 19.

Proportion of vocational trainers who use digital learning technologies, by number of employees (in percent).



Source: Dornmayr et. al. 2019b.

Another viable route for training companies is to cooperate with supra-company vocational training institutions that often have already carried out preliminary work on digitalised training methods or have integrated digital training elements into their training plans.

2.2.3 Support measures

To help and support training companies and apprentices in handling the process of digitalisation, various initiatives have been installed.

- One of these is a financial support system called ‘Digi-Scheck’ (‘Digi Voucher’) implemented in the year 2021.⁹³ This scheme supports participation in courses which impart or strengthen the contents of job profiles or those taught at vocational schools as well as vocational meta-skills (e.g. in the fields of digitalisation, resource management or climate protection). Apprentices must apply for this kind of support. 100 percent of the costs of approved courses may be refunded up to a ceiling of 500 Euros per course. Apprentices may attend up to three courses per calendar year. So far, 6,440 apprentices have received financial support through ‘Digi-Scheck’ and a total of 10,437 courses have been attended. This funding scheme was originally limited to the end of 2021 but will now be extended until 2024.
- The Chamber of Commerce is providing support and a new service in form of the digital training and further education platform ‘wise up’ which has now also been opened up for apprenticeship training.⁹⁴ This digital learning platform offers the option of uploading one’s own learning content and assigning it to the employees as mandatory or voluntary training content. Available learning formats are text and audio files, video, quiz formats, SCORM (Sharable Content Object Reference Model), surveys, live events etc. The training

companies can upload different learning content to the platform, which is assigned to the apprentice in the format of a short, self-made video or as a document via the trainers. This enables apprentices to use the platform to access learning content via an app on their Smartphone, tablet, or desktop. — A service also provided by the Chamber of Commerce is the internet platform ‘<https://www.ausbildungsfahrplan.at/>’. This is a digital tool for companies, trainers and apprentices and provides an overview of the content of apprenticeship training schemes. Specific training activities can be recorded, and files can be up-loaded. The tool also offers trainers and apprentices the opportunity to provide feedback on the various training contents.

2.3 Tools like SELFIE

2.3.1 ‘CHECK’ and ‘QUIZ’

The ‘fit4internet’ association is a non-partisan and independent initiative to qualify and quantify the digital skills of the Austrian population.⁹⁵ Its primary goal is to enable the competent use of digital technologies and the broad participation of society as a whole in digitalization. ‘fit4internet’ (<https://www.fit4internet.at/page/home>) works in close cooperation with many different institutions, stakeholders and with companies. On their website there are tools to assess one’s digital skills: ‘CHECK’ contains self-assessment questions and ‘QUIZ’ consists of knowledge questions. After finishing the test there is a report with the test results available to download. This report contains an individual evaluation that shows the areas in which there are sound digital competences and

93. <https://transparenzportal.gv.at/tdb/tp/leistung/1060961.html>

94. <https://wise-up.at/>

95. <https://www.fit4internet.at/page/home>

in which areas there is room for improvement. Both instruments record the current level of competence in relation to the various competence levels of the Digital Competence Model for Austria – DigComp AT.

‘CHECK’ is presented in two versions: A ‘light’ and an ‘advanced’ version. The light version can be chosen if the person taking the test is new to the topic of digital skills and would like to take a step-by-step approach. The advanced version of CHECK is for people who already have basic/advanced digital skills which you need to understand and correctly interpret the possible answers.

‘QUIZ’ is available in four different versions ranging from digital competence level three up to competence level five and one combined version of these three variations. Both tools use every day or professional situations to conduct the test and identify the respective levels of digital competencies.

There is a broad variety of subject matters offered for ‘CHECK’ as well as ‘QUIZ’:

- Everyday life
- The workplace
- Safety
- Artificial intelligence
- Parents
- Data science
- Media Literacy
- Internet of things and robotic
- Blockchain
- Industry 4.0

2.3.2 digicheck

‘digicheck’ is an online questionnaire on digital skills provided by the Federal Ministry of Education, Science and Research.⁹⁶As part of the digi.komp initiative of the education

ministry digi.check helps pupils and teachers of the general education school sector to gain an overview of their digital and IT skills and teaching personnel to get a picture of the digital and IT skills of their pupils. The digi.komp competency model defines the goals of digital and IT competencies that learners and teachers should have acquired at certain points in their school or professional careers. The appropriate digi.check is offered for each digi.komp level to reflect on the competences acquired and to be able to plan further educational steps in a targeted manner based on the results. ‘digicheck’ is available for primary school level and for secondary school levels I and II.

This test tool uses two types of questions:

- Single Choice Standard: in the classic single choice question the correct answer must be selected from four answer options.
- In Application questions: these are questions that must be solved using the help of certain application programmes (e.g. with a spreadsheet programme).

3. DIGITAL INFRASTRUCTURE AND USE OF DIGITAL TOOLS

In this section of the chapter, we will look at the current state in Austria relating to the usage of digital technologies and various aspects of digitalisation. First the focus is on the apprentices’ perspective; the second subsection deals with the digital infrastructure at Austrian vocational schools.

96. <https://digicheck.at/>

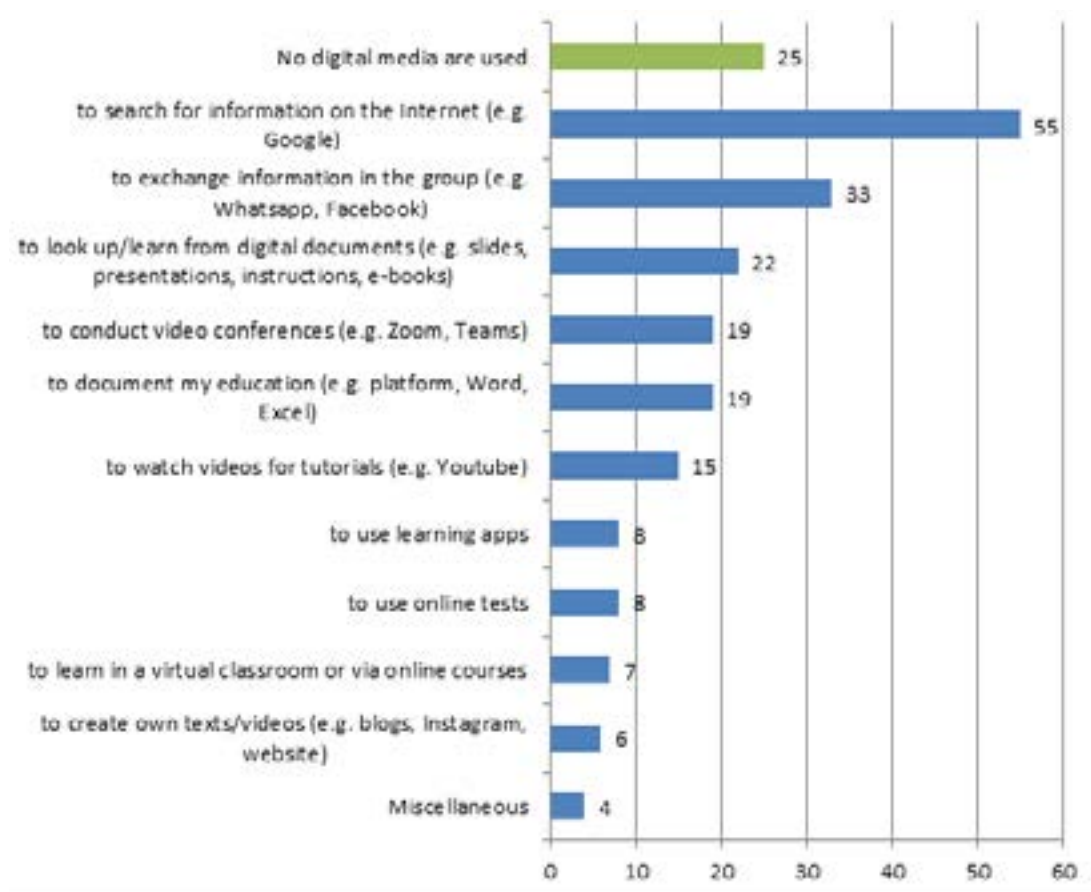
3.1 Aspects of digitalization from the apprentices' perspective

As mentioned already, the so-called 'Lehrlingsmonitor' ('Apprenticeship Monitor') is a study which was created for the first time in 2015. This report is carried out on a regular basis and analyses the overall situation of Austrian apprentices. The basic idea of the Apprenticeship Monitor is to generate knowledge from the perspective of apprentices to further develop the apprenticeship training system in the interests of learners against the back-drop of current challenges.

The fourth edition of the monitor contains data generated by questioning over 4.000 apprentices

from almost all training areas. Some of the items used in the chapter relate to questions of digitalisation. The following table presents the results regarding the question whether digital media is used in training companies in the teaching and learning process. As many as 25 percent of the apprentices stated that there were no digital media used within their in-company training programme. Learning platforms used to document the progress of training was used in less than 20 percent of the training companies. These figures show that there is still room for improvement regarding the use of digital learning technologies. But one must consider that there is a difference when differentiating these results according to the economic/occupational section of the respective training companies (see further below).

FIGURE 20.
Are digital media used in your training in the company? If so, what for? (in percent) .



Source: Lachmayr/Mayerl 2021.

In another question more than half of the apprentices stated that they use both IT infrastructures in their work as well as using digital media in their training. One fifth of apprentices only used digital media in their training, but do not use IT infrastructure. Conversely, this occurs less frequently, i.e. the use of IT infrastructure but no use of digital media. Around one fifth of apprentices use neither IT infrastructure nor digital media.

A detailed analysis of the group that uses neither IT infrastructure nor digital media primarily shows occupational differences. The highest proportions of non-use of digital technologies are found in the traditional trades and tourism professions (such as painters, catering specialists, cooks, bricklayers, carpenters).

In another recent study, apprentices' usage of digital tools by type of end device was analysed (see Table 3). Video conferences were used quite often both on company related devices and on private digital tools and are by far the most common learning form at the time of the survey. The usage of training platforms, cooperative learning tools and digital learning materials in general have been more common on private devices. The low utilization rate of training platforms is quite noticeable, especially on company owned devices. This kind of digital learning obviously is currently not very prominent within in-company training settings, which again leads to the conclusion that there is some need to catch up.

TABLE 3.
Apprentice's usage of digital tools by type of end device (in percent).

	Video conferences	Training platforms	Tools for cooperative learning	Digital learning materials
Learners regularly use company devices				
Very often	33	17	18	11
Frequently	31	17	23	26
Seldom	22	20	18	26
Not at all	14	46	43	37
<i>Very often + Frequently</i>	<i>64</i>	<i>34</i>	<i>41</i>	<i>37</i>
Learners regularly use private devices				
Very often	24	24	10	9
Frequently	40	24	40	43
Seldom	28	16	20	22
Not at all	8	36	30	26
<i>Very often + Frequently</i>	<i>64</i>	<i>48</i>	<i>50</i>	<i>52</i>

Source: Gössling 2022; own calculations.

3.2 Digital infrastructure at Austrian vocational schools

The Federal Ministry of Education, Science and Research has been conducting periodically

surveys on the equipment and use of IT infrastructure at Austrian schools since 2009. The most recent survey to date took place in June 2020 and focused on the areas of internet connectivity and internet use, school networks,

e-learning, and questions about how distance learning is handled during the COVID-19 situation.

The following table shows the status of WLAN infrastructure at diverse types of schools. It also allows comparing the state of equipment of the part-time vocational schools for apprentices and the full-time vocational schools. 'WLAN in all classrooms and common rooms' is available at about 75 percent of the full-time schools whereas only at 47 percent

of the part-time schools. On the other hand, no WLAN or WLAN in less than half of the rooms is the case in about 31 percent of the schools visited by apprentices. In the full-time version of vocational schools this only applies to around seven percent of the institutions. The bandwidth of the WLAN used is also more of a concern at the part-time vocational schools: a third of these schools have access to an internet connection with more than 100 Mbit/s whereas this applies to almost 60 percent of the full-time schools.

TABLE 4.

Internet connection and use in the classroom by type of school (in percent).

WLAN	Part-time vocational schools	Compulsory schools in total*	Full-time vocational schools
No WLAN available	14,0	15,8	2,4
In less than half of the rooms	17,5	11,0	4,8
In half of the rooms	5,3	5,5	2,4
In more than half of the rooms	15,8	18,2	15,9
In all classrooms and common rooms	47,4	49,5	74,5
Bandwidth download stream			
Less than 100 Mbit/s	24,6	50,7	22,7
100 Mbit/s	42,1	29,0	19,1
More than 100 Mbit/s	33,3	20,3	58,2

*Includes elementary schools, new middle schools, special needs schools, prevocational schools, and part-time vocational schools

Source: Federal Ministry for Education, Science and Research 2020.

The differences regarding the use of digital infrastructure for pedagogical work and the various forms of distance learning used is not that different between the two types of vocational schools as can be seen in the

following tables. But there is one difference: part-time vocational schools still seem to use a lot of non-digital learning materials on paper compared to the full-time vocational school system.

TABLE 5.

Use of the IT infrastructure within the pedagogical work by type of school (in percent).

Use of digital technologies	Part-time vocational schools	Compulsory schools in total*	Full-time vocational schools
Pedagogical Concept	38,6	59,5	45,4
Through a steering group	50,9	25,1	53,6
Miscellaneous	22,8	24,8	19,2

*Includes elementary schools, new middle schools, special needs schools, prevocational schools, and part-time vocational schools

Source: Federal Ministry for Education, Science and Research 2020.

TABLE 6.

Forms of distance learning by type of school (in percent).

Provision of learning materials	Part-time vocational schools	Compulsory schools in total*	Full-time vocational schools
Learning platforms	93,9	47,8	99,6
Communication tools	24,6	40,0	35,1
Short message services	46,5	43,4	21,9
E-Mail	86,0	73,2	79,3
On paper	28,1	83,0	9,6
Miscellaneous	7,0	15,1	7,2

*Includes elementary schools, new middle schools, special needs schools, prevocational schools, and part-time vocational schools

Source: Federal Ministry for Education, Science and Research 2020.

4. QUALITATIVE RESULTS

To evaluate the usability and functionality of SELFIE WBL within the Austrian dual VET sector, four interviews have been conducted in total:

- with a principal of a part-time vocational school for mechanical engineering, production engineering and electronics,
- a teacher at the same school,
- an apprentice at the same school,
- the fourth interview was conducted with the head of apprenticeship training in a company developing and manufacturing mechanical and electronic locking & access control systems.

Before the interviews were conducted, all four interviewees filled out the respective part of the SELFIE WBL questionnaire.

4.1 Part-time vocational school

The participants at the part-time vocational school did not have any specific expectations

before using SELFIE WBL. The principal and the teacher however were generally interested in the topic of digitalisation not least because of the highly technical alignment of this specific school dealing with mechanical engineering and electronics. There are also high demands with respect to digitalisation within the economic sector represented by the school ('We act to avoid having to react.'). This school for example is dealing with subject areas like digital manufacturing and 3-d-printing technologies ('Industry 4.0').

All three participants completed the questionnaire on a personal computer at the school using the Chrome-browser. Registration worked very well and the instructions for completing the questionnaire were also clear and easy to follow. The questions from SELFIE WBL were rated as well formulated and comprehensible throughout ('The questions were easy to understand and easy to answer'). The use of a multi-level scale to answer the questions was also mentioned as a positive characteristic of the survey. The possibility to switch between the different sections of the questionnaire while still retaining the already answered questions/contents was mentioned

as a useful feature regarding user friendliness. As a little criticism aside, the principal remarked that to fill in the questionnaire, at the start of SELFIE WBL one must register as apprentice/learner because otherwise it is not possible to use the tool. This is due to the necessity to specify a minimum number of participants at the beginning of SELFIE WBL.

The young learner also rated the design and the content as well done and issued no specific critical complaints. The apprentice furthermore was especially interested in the topic of data security and the safe use of the internet, an issue that is of particular interest from his point of view – especially for young people. The integration of these issues and discussion points in SELFIE WBL therefore was mentioned as specifically important and well thought out. The inclusion/participation of learners in the Selfie-survey was welcomed by the apprentice and is thought of as a particularly promising idea as it enables one to also take the learners viewpoint into consideration.

The length of the questionnaire was judged to be about exactly right by all three interviewees. The teacher noted that the scope of the questions he had to answer was significantly greater than the questionnaire for the apprentices ('I had eleven pages to fill in, the learner about four pages. Eleven pages are a bit much'). The principal has also addressed this issue but said: 'The number of questions for the school management was also relatively high. But the point [of the questionnaire] is to scrutinise and not just quickly click on something and rate it.' But even in this case, no fundamental criticism was voiced, e.g. by suggesting questions for deletion.

A suggestion for improvement was made by the teacher: he put forward the idea to reverse the rating scale of the survey at about the

middle of the questionnaire to make sure that the people filling it in are actively participating and scrutinizing the items ('That you actively read the whole questionnaire and not just work through it superficially.').

The option to create your own questions was rated positively because it allows individualising the survey and therefore enables more flexibility. However, this option has not been used in this specific case. The reason for this is the following: the principal first wanted to look at the questions and get an overview of the content to decide whether and which additional questions would be useful. However, he was not technically able to utilise this option. ('I got stuck somewhere and then said: OK, I'll take it [the questionnaire] as it is.').

The organisation of SELFIE WBL with its eight subareas is assessed as positive with no relevant item or area missing. Even in the case that some participants see the need to add additional questions or areas of content the option to create questions of your own is mentioned as a good and functional way to address this issue.

Involving parents in the survey was not rated as a viable option. The argument was that the learners themselves have chosen their apprenticeship training, and the parents may have a whole different view of the training scheme ('Let's assume that the father works in a nursing profession and the young person is attending an apprenticeship in production engineering or mechatronics.'). In addition, the question is whether the parents can assess for example the digital infrastructure at the vocational school properly.

Regarding the timing of the SELFIE WBL survey, the interviewees are of the opinion that this questionnaire should only be held at the end of the first school year or not at all until the second school year.

The report provided by SELFIE WBL at the end of the survey was considered well done regarding the design and usability as well as the content. At the participating school, this report will be used to further expand and strengthen the digital strategies at the institution ('It is an analysis tool and delivers results that I can continue to work with. ... It is a working basis for schools to develop further.'). Based on his experiences with SELFIE WBL the principal is planning to roll out the tool in the following year comprehensively and involve more teachers and apprentices/learners as well as training companies and subsequently evaluate the corresponding results. To fully assess the potential of SELFIE WBL within the Austrian dual VET context, there would have to be a bigger sample size with a lot more participating schools and companies.

As the items making up the questionnaire are not overly specific, the principal believed the survey can be used covering all economic sectors and apprenticeship areas although the specific digital skills needed are vastly different when taking the economic sector and/or the job profiles into account. Whether the SELFIE-tool can be successfully used in this sense depends on the ability of the respective users to interpret the results realistically and accordingly.

As a side note, one of the experts questioned from ibw Austria (see section 5.2) noted that SELFIE WBL is a self-evaluation tool that provides a rough overview but does not provide any recommendations for action. Ideally, school administration as well as teachers should therefore receive instructions on how and in what form they can integrate digital content more specifically in their didactics. But generally speaking, the collections of questions in SELFIE WBL are deemed useful and can lead to a closer examination of the topic of digitalisation and at the same time can help reveal a lack of resources or shortcomings in digital integration.

4.2 Training company

The representative of the training company reported as well that the registration process worked fine and fluently using a laptop. The instructions for filling in the questionnaire were rated as easy to follow and the questions itself were clearly formulated according to the interviewee ('It was pretty self-explanatory.'). The scale used in SELFIE WBL to rate the distinct items was also mentioned as easy to understand. Furthermore, the participant explicitly stated that the information at the beginning of each survey unit made it easy to understand the aim of the respective questions ('I was able to orientate myself very well on these instructions ... it was very helpful.').

No changes were requested about the content of the questionnaire. The questions were rated as comprehensive and complete. Only at the end of the survey the interviewee had the impression that the focus of the questionnaire was primarily on the school side of things which at first made it little bit difficult for him to answer the questions. But that was just a minor point of criticism and not really voiced as a substantial problem.

The length of the questionnaire was said to be about perfect ('Not too long and not too short ... It was really entertaining.'). This is an essential point in this matter because training companies do not usually have the time resources to deal with a survey like this when it is too time-consuming. From the perspective of the interviewee answering the questions and filling out the survey, overall was experienced as very intuitive which obviously underlines the quality of the design of SELFIE WBL. Even if it takes some time to complete the questionnaire the whole experience is rated as worthwhile and therefore the interviewee certainly will recommend the tool to other companies if the opportunity arises.

As the intention of SELFIE WBL is to collect information and try to self-reflect on the issue of digitalisation, this tool was rated as a valuable aid in identifying the status regarding the use of digital technologies within the learning setting in the company. The questionnaire can therefore help to figure out potential weak points and shortcomings to work on.

The participating training company in its economic field of work is highly specialised and very technical oriented. Therefore, naturally there is a close affinity to all aspects of digitalisation and digital technologies ('It is a clear corporate goal to digitalise as many areas of the company as possible ... We have already done this in many areas of apprentice training.'). The results of the final SELFIE-chapter thus will be used to support the further development and implementation of a digital strategy within the company.

As many occupations especially in the technical world are becoming digitalised increasingly – like the shift to digitalised production processes – the respective (apprenticeship) training schemes contain more digital procedures and technologies replacing 'traditional' work processes involving a hands-on approach. These apprenticeship training programmes therefore have changed because of these new challenges and have been expanded ('You still must teach the basic skills just as you did 30 years ago, the feel for the material, the processing ... However, digital technologies have of course become increasingly prevalent.'). In this process the occupational profiles have changed significantly.

In this training company, every apprentice receives a notebook on the first day of work/training. This notebook is used by the learners during the whole training and learning process for work records, technical drawings, to store

and review all the learning content, which is taught in the company, researching the internet, etc. Since about three years a special learning platform is also used called 'Masterplan' which is built similarly to Netflix. The apprentices can choose from a vast variety of learning videos and thus can manage their learning process individually. Moreover, many of these videos are produced by the training company itself and added to the database of the learning platform. To use this tool one can simply login via a browser making it accessible with any device like personal computer, note-book, Smartphone, etc. ('It's really a great instrument and is extremely well received by young people.'). In addition, there is a special team in the corporate division of operations within the training company that exclusively deals with issues and challenges regarding digitalisation.

In the interview it was also mentioned that the training company is in good contact with the part-time vocational school because one of the trainers and one of the teachers at that school are connected. Besides that, however, there is little to no exchange between the company and the school. Therefore, a sort of 'jour fixe' once every semester was suggested to enable an exchange on a regular basis. Such regular contacts are also important in regard of digital strategies and learning methods of course. From other studies we know for example that sometimes schools and training companies use different IT-systems and tools or different versions of such instruments creating friction in the training and learning process. SELFIE WBL could be used as a tool to strengthen such cooperations and support companies and schools in finding ways to deal with the challenges posed by digitalisation.

5. DEVELOPMENT OF CURRICULA: SELFIE WBL AS ASSISTING TOOL

5.1 Specific challenges

In discussing the role of SELFIE WBL within the process of developing new apprenticeship curricula there is one important aspect to consider. Currently there are over 200 apprenticeship schemes in Austria and the extent and level of digital skills and knowledge required vary greatly. This also has an impact on how familiar the schools and teaching staff is regarding digital tools. As the research literature has shown, digitalisation in the teaching and learning process can only succeed if the teachers and trainers have such a proximity to digital technologies and the corresponding skills. The International Labour Organisation mentioned this specific aspect in a recent study:

A low level of technological knowledge and confidence makes educators anxious about using technology with their apprentices, and these factors influence educators' motivations to use technology.

To emphasise this issue, the following table shows the respective levels of digital skills

imparted in some selected apprenticeship curricula, respective to the skills necessary in the related occupations. The data base for this classification is DigComp AT: Austria has its own competence model for digital competences which is called the 'Digital Competence Model for Austria - DigComp AT'. It was derived from the European Reference Framework for Digital Competences (DigComp 2.1). The occupational profiles and the extent to which digital skills are required in the respective occupation depicted in Table 7 were categorised according to the DigComp model. The categorisation of the necessary digital skills corresponds to the average of the ratings of the six individual skills areas of the DigComp model.

As the following table shows, the digital skills for these five selected range from fundamental ('Florists can use every-day and job-specific digital applications and devices for communication, collaboration, and documentation and to operate job-specific digital devices. They also know the company data security rules and can comply with them.') to highly specialised: 'Software developers are experts in all areas of digitalisation. They can determine, evaluate, and analyse enormous amounts of data in different and constantly changing contexts. Based on this they develop new derivations for applications, business models, problem solutions, etc. The skills required depend heavily on the specific field of activity but always require a specialised and demanding level.'

TABLE 7.

Levels of digital skills necessary in selected apprenticeships/occupations.

Occupation	Level of digital skills necessary							
	Fundamentals	Independent use	Advanced	Highly				
Florist								
Chef								
Office assistance								

Occupation	Level of digital skills necessary							
	Fundamentals		Independent use		Advanced		Highly	
Automation engineering								
Software development								

Source: <https://bis.ams.or.at/>.

Because of these vastly various levels of digital skills required and the proximity of a specific occupational profile to digital solutions, it may be difficult to use one single instrument like SELFIE WBL to cover the specific needs of all the respective apprenticeship schemes. This issue should always be kept in mind when discussing this topic. In the following sub-section, we will look at the options and possibilities the various experts contributed to the discussion.

5.2 Expert feedback

To see whether SELFIE WBL can be useful in the development of transversal as well as specific digital skills and learning environments, two groups of experts have been contacted. On the one hand, these were experts from the ibw Austria – Research & Development in VET. On the other hand, we contacted two representatives from the Austrian Chamber of Commerce.

5.2.1 Transversal digital skills

Within our context so-called ‘transversal skills’ are digital competences that will be the learning outcomes in all Austrian dual VET profiles. These are basic competencies and learning arrangements which can be expected to be implemented in the entire array of apprenticeship training schemes in Austria. As mentioned in section 5.1, the levels of digital skills vastly differ regarding the over 200 apprenticeship training curricula and the respective occupations they prepare for. As the questions contained in SELFIE WBL

are formulated in general terms, it should still be possible to use the instrument for the development of such transversal aspects and dimensions regarding digitalisation. The feedback of one of the experts of the Austrian Chamber of Commerce was structured according to the different target groups of SELFIE WBL. The part of the questionnaire aimed at the school management is regarded not helpful in the development of training regulations and job profiles because the target group is usually not relevant in the process (at least not for the creation process per se). On the other hand, it could be helpful in identifying priority schools or project schools or in identifying digitisation needs for part-time vocational schools and their teaching staff (for which the questionnaire is obviously also intended).

The part of the questionnaire aimed at apprentices/pupils is primarily relevant in regard of the equipment of the schools, but not so much for the training companies. Relevant questions start from category 5 (‘In our company, I have internet access for learning.’). Up to category 6 (‘In our company, I learn how to check whether the information I find on the internet is reliable and correct’), the questions can help us to determine the degree of digitalisation in the respective companies, draw attention to any training deficits and identify needs in the development of apprenticeships.

Regarding the part of the questionnaire intended for the trainers the following feedback was given. The following questions are deemed not relevant for the development of transversal skills:

- ‘As a company, we are involved in the development of the school’s digital strategy.’
- ‘In our company, we use digital technologies for regular communication with the school.’
- ‘In our company, we use digital technologies to organise the transfer of learners between school and training company’

Also, all questions on the assessment procedure used at the schools regarding the apprentices are qualified as not important for the specific use in developing new curricula as the methods of assessment at school say nothing about the in-company training.

Otherwise, the questions could be used for transversal skill development, although not for IT-specific apprenticeships because the level of content is simply too low. The principal of the part-time vocational school interviewed for this chapter also considered the questions in SELFIE WBL as not too specific and therefore as useful to determine the current situation regarding digitalisation across all apprenticeship sectors.

One of the experts of ibw argued that the Austrian school landscape is strongly characterised by specialisation within school levels or according to the type of school. In the vocational sector in particular, timetables are adapted according to professional requirements and qualifications. A chef therefore uses much less digital content than, for example, a commercial assistant or a computer scientist. This feedback underlines the points made in section 5.1.

5.2.2 Specific digital skills

As already mentioned in the previous section, SELFIE WBL can certainly be used to identify transversal digital skills and learning

environments across the various apprenticeship training schemes and occupational sectors. But to use the instrument in identifying specific skills and requirements for training curricula and occupations in the field of Information technology, it must be adapted in any case. All the experts involved agreed on this.

As the questionnaire offers the possibility to create your own questions and therefore specify the content, one should be able to adapt the survey accordingly. If this option is sufficient to create a tool suitable for this extremely specific purpose is unclear now and the consulted experts very much doubt it. The question is whether the total of ten questions, which can be formulated freely, is sufficient to tackle the demands in this context.

Another issue has also already been discussed in section 5.1. Some of the questions in SELFIE WBL are not useful when it comes to the development of skills and/or curricula, as for example most parts of the survey aimed at apprentices/pupils are not relevant in this regard. So, at this point the question posed in this sub-section therefore cannot be answered comprehensively and conclusively.

6. IMPLICATIONS AND IMPACT OF THE COVID-19 PANDEMIC

6.1 State of research: Brief overview

The challenges for dual apprenticeship regarding the process of digital transformation

– drastically accelerated by the pandemic⁹⁷ – are twofold: on the one hand, digital support technology in the realm of vocational learning is becoming more relevant. On the other hand, the digitalisation of technical and professional content and new forms of work requires changes to in-company learning. Studies from Germany for example illustrate the impact of the health crisis on the dual VET sector.

One study concludes that since the pandemic the use of digital learning media and formats has increased further compared to previous years. While the typical training company in Germany used an average of 3.3 digital learning media/formats in 2019 and 3.6 in 2020, the average number of different digital learning media/formats used in 2021 was up to four. It is noticeable that only a few companies use more than six digital learning tools. This suggests that most training companies consciously opt for a specific canon of three to six different digital learning media/formats that suit the individual circumstances in the company and the resulting requirements.

The author though tends to differentiate the results regarding the effects of the COVID-19 pandemic. It has been observed that during the pandemic, companies have been using an increased number of digital learning media. However, this development is only evident in those companies that were already supporting training with digital learning media before the lockdown. This would suggest that ‘digital latecomers’ in apprenticeship training have not been able to catch up. This would lead to the conclusion that especially training companies with no or little use of digital technologies need special attention and support.

97. Faßhauer 2020 even called the ‘Corona crisis ... a catalyst for the further development of vocational training.’

The dual nature of the apprenticeship system with its separation of theoretical learning in vocational schools and the practical training in a company creates special challenges. As the ILO writes in an article in this respect:⁹⁸

Together with Industry 4.0, the COVID-19 pandemic has recently been a driver for the digital transformation of workplaces and apprenticeships. [...] CEDEFOP [...] reported that in many countries, at least the theoretical part of apprenticeship programmes was taught through 100 per cent online solutions. However, the work-based learning component of the apprenticeship was strongly disrupted. This learning is usually based on training in procedural competences, which are particularly difficult to teach without manipulating tools, materials, and equipment at school or in the workplace.

This issue also occurred in the interview the authors conducted with a school principal and a teacher at a part-time vocational school for this chapter, an issue which does not present itself in this form or extent for full-time vocational schools with only a little amount of practical training units. In the following sub-section, we will take a closer look on how the Austrian part-time vocational schools for apprentices tackled this challenge.

6.2 The situation in Austria

Whereas the full-time vocational schools have been well equipped regarding digital resources the part-time vocational schools have not been using as much of that technology for varied reasons. One of these reasons is the fact that a lot of the apprenticeships are within the trade and crafts sector which naturally has a much

98. ILO 2022

more hands-on approach in the educational setting. Therefore, the learning taking place in the workplace and in a school is quite different in their potentials regarding the (pedagogical) organisation of vocational learning. Other restraints in relation to the digitalisation of learning are of course due to the amount of technical equipment available (see for example sub-section 3.2).

In a related recent study, 77 vocational trainers in Austria have been interviewed. The sample encompasses companies of all sizes and a broad range of economic sectors. The following

table shows the type and number of digital tools used in the in-company training during different points in time. The results clearly illustrate the shift caused by the necessities during the pandemic and the related lockdowns. Whereas Messenger services and video conferencing was rarely used or not used at all before Covid, this changed into these tools being used on a frequent basis. Although this usage again decelerated a little bit after the lockdowns, there still is a 'paradigm shift' visible. Other empirical results will further illustrate this point.

TABLE 8.

Use of digital tools in in-company training (Median (central value) of the survey results).

Tools	Before the Pandemic	During Lockdown	Outside of Lockdowns
Online apprenticeship adverts	Frequently	Frequently	Frequently
Messenger services	Seldom	Frequently	Frequently
Video conferencing	Not at all	Frequently	Seldom
Digital training platforms	Not at all	Seldom	Not at all
Tools for cooperative learning	Not at all	Seldom	Seldom
Digital learning materials	Not at all	Seldom	Not at all
Digital exam preparation	Not at all	Not at all	Not at all

Source: Gössling 2022.

The part-time vocational school participating in the SELFIE WBL evaluation conducted for this chapter used a learning platform as well as blended learning during the lockdowns and quickly expanded this usage. After the pandemic, these tools are used a little less right now.

According to the principal of this school, the utilisation of digital tools and technologies to aid learning processes is frequent practice at his institution. However, he qualified this by saying that this must be done in moderation because of the necessities of working at machines

with your own hands. Certain aspects of this specific apprenticeship training in the realm of mechanical engineering, production engineering and electronics cannot be taught properly through digital tools. As the interviewed head of training in the training company put it: ‘In craft activities and jobs, we will never be able to completely avoid this, learning on site, on the machine, on the parts, on the product ...’

So, within manually oriented apprenticeship programmes and the respective occupations there is always an important focus on the hands-on approach within the training setting. An important question will be whether the rise of new digital solutions such as augmented reality and virtual reality can successfully transfer some of these training aspects within the digital sphere and therefore will be able to simulate professional experiences outside of workplaces properly.

Another problem mentioned in the interviews with the principal as well as the teacher at a part-time-vocational school was labelled ‘overload.’ Whereas before the pandemic there were only a few learning platforms and online-communication tools available the number of respective digital applications increased significantly during the crisis. So, in the current moment the school is busy with ‘cutting down’ on all these different options which are, as said, characterized as becoming an overload.

In the research project ‘Corona as a chance,’ changes in dual apprenticeship training are

currently being analysed in the wake of the Covid-19 pandemic. The research goal is to assess resulting developments in the use of digital (learning) environments in the in-company part of dual apprenticeship training. The study is two-part: in a first step, VET trainers have been interviewed via an online survey. Building on these results eight in-depth interviews were conducted with VET training managers and VET trainers from various occupational sectors. Key focus of the interviews was the digital environments that were and are used in the training companies before, during and after the Covid-19 pandemic.

The results show that some companies were already working with e-learning, teaching/ learning videos and online learning games before the pandemic. As was to be expected the measures taken due to the pandemic also led to an increased use of digital technologies in the training companies. All interviewees increasingly worked with online platforms and video conferencing using tools such as Zoom or Microsoft Teams. In addition to online training or distance learning video conferencing was also used for work-related purposes such as project meetings. All the people interviewed used digital environments for learning and work-related purposes as well as for organisational purposes.

The following table presents three examples of best-practice usage of digital technologies in the learning and teaching process in a training company.

TABLE 9.
Examples of successful digital learning environments in training companies.

Learning environment	Content
Impulse lectures - Independent task solving - Feedback	• Learners and teachers are physically separated • Specialist content is presented in a period of 30 to 60 minutes including E-Learning and learning videos • Apprentices are given tasks relating to the previously discussed content • They must complete the tasks independently • Tasks are discussed, relevant aspects are repeated, mistakes are corrected

Learning environment	Content
Self-created learning videos and podcasts	• Topics and some relevant content points are specified • Learning content is produced by apprentices for apprentices, in youth language and dialect • Age-appropriate learning content that can also be used for in-company training in the long term
Self-created digitalised training folder	• Collection of files with work-related learning content • Possibility to search content as with a search engine: keywords can be entered for the topic searched for to obtain various information • If no answer is found apprentices are asked to create content themselves (e.g. work processes are photographed, commented on, and explained with the help of the trainer) • The new generated content is made available to the other apprentices via the digital training folder

Source: Borbe 2022.

The author of the study concludes that due to the events surrounding the pandemic, paradoxically there has been a further development in company training work and the crisis enabled opportunities to be realised more quickly than would have been possible without the pandemic. As already mentioned before, there obviously has been a kind of 'small paradigm shift' in the use of digital tools in dual VET in Austria. This existing dynamic should be capitalised on and SELFIE WBL certainly can be used as a support tool and as an external incentive to continue this positive trend.

Another study reaches the conclusion that in relation to the use and intent of digital learning tools there are basically two types of vocational trainers respectively approaches:⁹⁹

Cases where the use of digital learning technology in in-company training was intended as an emergency solution to bridge a lockdown, the use of digital technologies merely functioned as substitution for face-to-face training. As soon as the circumstances changed back to normal the scope and intensity of the

use of digital learning tools also declined.

- This approach contrasts with vocational trainers who associate the use of digital learning technologies with more than just the substitution of face-to-face training. In these cases, digital learning technologies are seen as being capable to supplement and extend face-to-face training if there is a stronger focus on self-directed, cooperative, action- and problem-orientated learning.
- In-company training staff must clarify the question of whether and for what purpose they want to use digital learning technology. Again, this brings SELFIE WBL into play: There must be support for vocational trainers (and vocational schools) in regard of this necessary process of clarification. We think that – also based on the results of the interviews with representatives from a training company and a vocational school – SELFIE WBL can play a significant role as a well-developed and easy to use supporting tool in this context.

99. Gössling 2023.

7. CONCLUSIONS

This chapter takes an in-depth look at Austria's dual Vocational Education and Training system, which is re-nowned for integrating work-based learning with theoretical education in part-time vocational schools. This model, deeply rooted in the Austrian tradition, is praised for its ability to adapt to the changing demands of contemporary labour markets. It works by maintaining a balance between practical training provided by enterprises and complementary theoretical education provided by vocational schools, resulting in an elevated level of satisfaction among apprentices and training enterprises. Key indicators, such as low youth unemployment rates and the cost-effectiveness of training versus hiring, underline the effectiveness of the system.

In addressing the impact of digitalization, the study reveals both the readiness and challenges facing the dual VET system. While some training companies and vocational training centers are well prepared, others are lagging behind in the use of digital tools and infrastructure. According to the work done, approximately 25% of training companies do not use digital technologies, highlighting significant room for improvement. The chapter also points to a disparity in digital resources between part-time and full-time vocational training centers and calls for improvements to bridge this gap.

In the work done in Austria, the SELFIE WBL tool has been evaluated as a potential asset to overcome these challenges. Through interviews with experts and feedback from representatives of vocational training centers and training companies in Austria, it is possible to say that SELFIE WBL was considered as easy to use, flexible and comprehensive. The tool allows customization of survey questions,

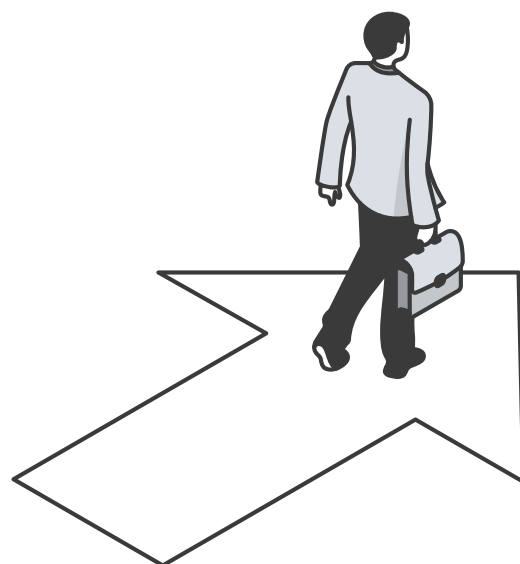
enabling tailored assessments of digital skills in various sectors. However, the chapter acknowledges limitations in its specificity, suggesting that while SELFIE WBL can help identify cross-cutting digital competencies, further customization may be necessary for it to effectively inform curriculum development in specific fields.

The impact of the COVID-19 pandemic on the Austrian dual VET system is also examined. The crisis acted as a catalyst for an increased adoption of digital tools and technologies in apprenticeship training. Although this trend slowed after the initial closures, it has resulted in a noticeable shift towards digital methods of apprenticeship. The pandemic has accelerated opportunities for innovation in training companies, prompting a re-evaluation of traditional training methods. Despite this digital shift, the chapter highlights the continued importance of hands-on training, particularly in sectors such as mechanical and production engineering, where practical experience is crucial. The potential of augmented and virtual reality technologies to simulate professional environments is explored as a future avenue to complement traditional training methods.

The chapter stresses the importance of cooperation between vocational training centers and training companies in developing and implementing digital learning strategies. It suggests establishing regular communication channels to facilitate better collaboration and exchange of ideas. SELFIE WBL could play a key role in this context by providing a structured framework for training centers and companies to assess their digital capabilities and identify areas for improvement.

In conclusion, the chapter highlights the strengths of the Austrian dual VET system, while recognizing the challenges posed by digitalization and the need for continuous

adaptation and improvement. SELFIE WBL emerges as a valuable tool, providing information on digital competencies and supporting the transition towards more integrated digital learning strategies. By building on the momentum created by the pandemic and addressing existing gaps in digital infrastructure and training, Austria's dual VET system can continue to thrive and meet the changing needs of the labor market. ■



Chapter 4.

Case study in Spain (The Basque Country)

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ABSTRACT

This chapter reflects a case study of the implementation of the SELFIE WBL tool in a dual training centre in the Basque Country. It has been carried out with a mixed methodology, collecting quantitative and qualitative data on the tool, the sessions carried out and the process.

It is based on the exploration of the integration of digital skills in VET institutions to enhance learner readiness for the evolving workforce. It emphasises the significance of aligning digitalisation in education with the demands of the modern economy and provides guidelines for a proper implementation of the SELFIE WBL tool in schools offering dual training.

In the context of the Basque Country Community's VET system, the integration of digitalisation is a strategic imperative to foster economic revitalisation and talent development. The latest VET law underscores the essential role of digital technologies in preparing individuals with the necessary digital competences for professional activities. This emphasis is aligned with the broader mission of creating an ecosystem for economic revitalisation based on a human capital and talent strategy. By integrating digital skills into vocational training, the system aims to equip learners with the competences required to thrive in a digitally driven workforce.

The policy relevance of this work lies in the qualitative information collected and the detailed proposed guidelines. Both elements offer the opportunity to learn about the experience of a school located in a quality VET system and to improve it by means of the proposed guidelines.

The study's key conclusions underscore the importance of expert support in guiding stakeholders through the implementation of digital tools like the SELFIE WBL questionnaire. Teachers and management teams value the presence of experts in interpreting results and formulating actionable objectives. Clear communication and understanding of objectives among all participants are crucial for the successful integration of digital tools in educational settings. The study highlights the positive impact of expert guidance in contextualising and utilising digital resources effectively, emphasising the need for ongoing support and collaboration amongst stakeholders.

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. This chapter proposes general guidelines on the overall process of SELFIE WBL implementation. It also provides differentiated guidelines for each profile involved: management team, coordinator, teacher staff, learners, and in-company trainers.

Future efforts should focus on enhancing communication strategies to ensure a mutual understanding of objectives across all participants. Additionally, further research is needed to explore the impact of expert support on the implementation of digital tools in educational settings.

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1. INTRODUCTION

1.1 General introduction to the issue

Vocational education and training (VET) holds a prominent position on the European agenda. It is crucial to comprehend VET requirements and attributes with respect to the digital revolution, which affect various facets of our lives, ranging from education to labour market accessibility. As the intermediary between the realms of education and training and the world of employment, the VET sector possesses the potential to significantly facilitate the process of digital transformation for both learners and prospective workers.

Supporting VET institutions and enterprises in maximising the benefits of digital technologies for instruction, learning, and training is imperative. SELFIE WBL emerges as an exceptional tool aiding schools and companies in adapting to the digital era, thereby contributing to the digital transition—a paramount policy objective of the European Commission.

The adaptation of SELFIE for work-based learning represents a crucial advancement for the digitalisation of VET and the dual VET model, serving as a unified reference point and fostering connections between VET institutions and companies.

The 2020 Council Recommendation on Vocational Education and Training for sustainable competitiveness, social justice, and resilience (European Union, 2020) delineated fundamental principles to ensure the ability of VET to align with labour market demands and offer high-quality learning opportunities. In the context of supporting the digital transformation

of VET provision, both within school-based and work-based settings, SELFIE WBL can assume a pivotal role, serving as the foundation for SELFIE WBL development.

Furthermore, various European Commission policies endorse the digital transformation of the VET sector and underscore the role to be played by SELFIE WBL, including the Digital Education Action Plan 2021-2027, the 2020 European Skills Agenda, and the Osnabrück Declaration on VET as a catalyst for recovery and equitable transitions toward digital and green economies.

1.2 Purpose of the work

This chapter focuses on a case study of the implementation of SELFIE WBL in a VET centre with dual training. It shows the research carried out in a scenario where SELFIE WBL is utilised to assess the integration of technology within the training system, both within school settings and within company environments. The case study is situated in the Basque Country region of Spain, known for having one of the most advanced VET systems in Europe. This region can offer valuable insights not only into the specific application of SELFIE WBL but also into the broader Basque Country VET system, which is renowned for its highly developed VET sector. These insights have the potential to serve as a foundation or benchmark for other regions and Member States.

The study has a dual objective: (i) to gather pertinent and first-hand feedback from actual users of the tool, aiding in the refinement of the prototype; (ii) to develop guidelines for the tool's utilisation based on user feedback, which includes basic steps, tips, recommendations, and suggestions for maximising the tool's effectiveness.

1.3 Research questions

The study was conducted with the following research questions in mind:

- What is the experience of all stakeholders in a dual training VET institution in implementing SELFIE WBL?
 - What are their first feelings and expectations?
 - What are their final feelings and how satisfied are they with respect to their initial expectations?
- What guidelines or improvements would help in the SELFIE WBL implementation process?

The questions are posed in such a way that the results will not only help to improve the tool, but also to develop clear guidelines that will benefit the SELFIE WBL implementation experience.

2. STATE OF THE ART

2.1 Basque Country Community's VET

2.1.1 History

The Basque Country Community (BAC) VET system is one of the reference models internationally, as there is a long tradition of adapting and developing VET to meet the real needs of both the labour market and citizens (Basque Government, 2022). The Basque Country's VET teaching and learning has been adapted and built over the years considering each of the plans developed and promoted in response to the demands of the labour market (Basque Government, [2022](#)).

It has been more than three decades since the Basque Government assumed the management of the education system, including VET (Mujika Aizpurua & Intxausti Sarriegi, 2018). During this time, there have been different cycles of transformation. Between 1980 and 1996, due to the transfer of the competence and responsibility of the education system from the national Ministry of Education to the different regional educational authorities, in the Basque Country, a shared vision was created by the new generation of school principals and teachers. At the beginning of this period, the VET system was weakened since it was disconnected from the labour market, and it was socially discredited as a second-rate schooling pathway. Therefore, it was necessary to restore the vision of training in professional competence, and to that end it was crucial to improve the educational offer, update the facilities and technological equipment, commit to alternative training, and involve in continuous training and lifelong learning. To reach these objectives, the creation of the network of specific VET centres was essential, becoming the first major differentiating element of Basque Country VET (Mujika Aizpurua & Intxausti Sarriegi, 2018).

In 1997, the first Basque Country VET plan was developed. The key to institutionalisation of Basque Country VET was the integrated system of professional qualifications, which had as an objective to integrate initial, continuous, and occupational VET into a single system. By the beginning of the 21st century, VET had become an important asset of the Basque Country, with funding being a key factor ([Mujika Aizpurua & Intxausti Sarriegi, 2018](#)).

The main challenge of the second Basque Country VET plan of 2004 was innovation, taking into consideration the technological transfer to the centres and learning methods. To promote these, TKNKA was created, the Center for

Applied Research and Innovation in VET of the Basque Country (Mujika Aizpurua & Intxausti Sarriegi, 2018). Since its creation, research and innovation applied in VET have been the main vectors of action (Astigarraga & Agirre, 2018). Therefore, the institution has become a dynamic element that makes it possible to transfer innovative products and services to Basque Country VET centres and the business sector (Astigarraga & Agirre, 2018). TKNKA functions as a network, involving the participation of VET centres and teachers, taking as its initial geographical scope of work the Basque Country Community, and opening up and collaborating with institutions around the world ([Astigarraga & Agirre, 2018](#)).

The 2009-2010 academic year saw a renewed look at what happens in VET institutions, considering what was happening at a social and business level (Astigarraga & Agirre, 2018). Some of the key concepts that underline this reflection were the following (Astigarraga & Agirre, 2018):

1. Companies require people with new competences and skills

The contemporary business environment is undergoing a significant transformation, characterised by the emergence of a new paradigm in which productive labour is the primary driver of economic growth. This shift is creating a demand for individuals with novel competences and skillsets, underscoring the necessity for a reorientation of the training programmes offered by vocational training centres.

2. Teamwork among teachers is necessary

It is no longer feasible for teachers to operate in isolation; collaboration within the teaching profession is becoming an indispensable aspect of the work environment. The advancement of

educational standards and the implementation of improvements will only be achieved if the teaching staff works as a unified team.

3. VET must develop specific technical competences as well as transversal competences

VET must develop the specific technical competences required for a given field of work. However, there is also an increasing demand for so-called 'transversal' competences, such as responsibility, teamwork and problem solving.

4. Overcoming the divide between theory and practice

For an integrated development of the required competences, the division between theory and practice must be overcome, and real situations and problems must be addressed through inter- and trans-disciplinary approaches.

5. Emphasise learning by changing the role of learners and teachers

The transition from pedagogical models that prioritise teaching to those that prioritise learning is crucial. This requires a shift in the roles of both the learner and the teacher. Learners must become more active and assume greater responsibility for their own learning, while teachers must become more oriented towards fostering and promoting learning than merely transmitting content.

6. Promote collaborative and cooperative learning

In this context, learners must play a leading and active role in their learning process. The learning process must also be collaborative and cooperative, oriented towards the resolution of problems and situations like those the learners will encounter in the working environment for which they are being prepared.

7. Prepare learners with appropriate digital skills and work on digital competence

Nowadays, the digital domain represents a pervasive and integral aspect of human existence. Consequently, it is imperative to cultivate the capacity to navigate this digital landscape as a digital citizen, upholding ethical principles and values in one's interactions within this domain.

8. Promote creativity and entrepreneurship

In the context of ongoing automation, factors such as creativity and entrepreneurship will enable individuals and businesses to maintain their competitiveness, thereby enhancing the quality of life for society as a whole.

9. New forms of organisation in educational centres

The aforementioned requirements necessitate the implementation of novel organisational structures for the centres, the distribution of timetables, the allocation of tasks, and the designation of spaces.

10. Change the view of evaluation, being more formative

Parallel to the modification and/or readjustment of the above-mentioned aspects, it is imperative to rethink the evaluation process, moving to a new, more focused approach.

During this academic year, a group of people with diverse backgrounds was created by TKNIKA to promote a didactic-methodological innovation in VET (Echeverría et al., 2017). This way, the two main axes for change were consolidated: (1) the identification, selection, and definition of the transversal competences; (2) the didactic-methodological option, which was focused on the use of active methodologies involving collaborative work (Echeverría et al., 2017). Therefore, the analysis of the existing

trends and educational practices led TKNIKA to define the ETHAZI model (High Performance Cycles model) for Basque Country VET (Astigarraga & Agirre, 2018).

2.1.2 ETHAZI model

In the 2013-2014 academic year, the ETHAZI model was implemented as a pilot experience in five public and state-subsidised Basque Country VET centres (TKNIKA, 2022). The key element of the learning model is based on challenge-based collaborative learning (TKNIKA, 2022). The challenge is understood as a pedagogical tool developed by a sequence of challenges that promote progress in competence development (Basque Government et al., 2021). These are the five characteristics that determine this model ([Basque Government et al., 2021](#)):

1. It is an active-collaborative experience: challenges are solved as a team, taking advantage of the potential of discussing and interacting amongst colleagues. Furthermore, the model contributes to learner-centred learning and the challenge is to provide conscious and autonomous learning through active methodologies.
2. It is developed following a creative process: challenges are designed to be treated as a creative process with the following resolution sequence: identification of the focus, ideation of the solutions, and selection of the most appropriate solution. This way, learners have the chance to train different strategies and thinking skills aimed at problem solving and decision-making.
3. It is based on a situation close to work and social reality: the challenges need to be centred on a productive and social environment and, therefore, they arise from the analysis of the professional and social reality. Moreover, as in reality, the

challenges have an intermodular approach where different technical, personal, and social competences are practiced at the same time.

4. It is a stimulating proposal for learners: challenges are designed to provoke the emotional management of astonishment, surprise, curiosity ... They involve effort and commitment, awakening the involvement, co-responsibility, and desire to learn.

5. It is a learning tool and medium: challenges are the key to a process of personal, professional, and social evolution. In this respect, evaluation must be understood as competence evolution and individual and group reflection, which the challenge includes in its strategic design.

FIGURE 21.
ETHAZI model.



Source: Basque Government, TKNIKA and FP Euskadi (2021).

Moreover, apart from these elements, the ETHAZI model requires a specific context where there are self-managed teaching teams to develop intermodular challenges so as to respond to a model of evolutionary evaluation of competences and flexible environments (Echeverría et al., 2017). Flexibility is one of the great benefits of the model since it allows the training and development of competences and

the incorporation of new objectives and context without deconstructing the learning process (Echeverría et al., 2017).

The fourth Basque Country VET plan of 2014 provided new impetus to innovation, as its objective was the contribution of the VET system to the science, technology, and innovation plan PCTI Euskadi 2020 (RIS3

strategy of the Basque Country) and to be an active collaborating agent of the Basque Science, Technology, and Innovation Network (Mujika Aizpurua & Intxausti Sarriegi, 2018). According to the innovation applied to the learning process, the aim was to generalise the ETHAZI (Mujika Aizpurua & Intxausti Sarriegi, 2018).

2.1.3 Digitalisation plans in the Basque Country's VET

Currently, 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 learners into the world of work (Subrahmanyam, 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, 2020). To this end, one of the main elements is the integration of digitalisation in the VET system (Spanish Government, 2020). In accordance with the Spanish VET, this educational level 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). The most recent Spanish VET law states that the use of digital technologies in professional activities is essential to prepare competent and professionally qualified workers, since digital skills comprise one of the professional qualifications needed throughout a person's life (Spanish Government, 2020).

In line with this law, the objective of the most recent Basque Country VET plan (No. 6) is to address an updated training offer capable of adapting to a rapidly changing technological landscape in 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 (Basque Government, 2022). These smart organisations will include many forms of learning through advanced and disruptive technologies (Basque Government, 2022).

Furthermore, the initial VET is oriented towards dual training, which combines learning processes in a company and in educational institutions through the co-participation of VET institutions and businesses (Basque Government, 2024). The training carried out by learners in a company must be closely related to the professional profile of the training programme (Basque Government, 2024). This provides the opportunity to promote learning and contribute to the acquisition of job-specific skills as well as transferable skills, which are crucial for increasing employability (Basque Government, 2024). 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, 2024).

2.2 SELFIE WBL

To support educational institutions in their digital transformation, DigCompOrg was created to help schools integrate digital technologies in teaching, learning and assessment (Kampylis et al., 2015). Based on this last framework, the SELFIE WBL questionnaire was developed to collect information on the views of learners, teachers, and school leaders on the use of technology in their schools (Castaño Muñoz et al., 2021). The tool was developed

in collaboration with a team of experts from educational institutions, ministries of education and research centres across Europe. The collaborating organisations include the European Training Foundation, the European Centre for the Development of Vocational Training (CEDEFOP) and the UNESCO Institute for Information Technologies in Education. The tool is available for diverse levels of education, including primary, secondary, and vocational. It is also available in more than 30 languages.

The tool's questions are categorised in eight dimensions (in relation to the DigCompOrg framework):

- **Area A | Leadership:** this dimension concerns the involvement of leadership in the comprehensive implementation of digital technologies throughout the school, ensuring their effective use in the primary activities of teaching and learning.
- **Area B | Collaboration and Networking:** this area relates to strategies that schools can explore to foster a collaborative environment and facilitate communication to share experiences and learn effectively both within and beyond organisational boundaries.
- **Area C | Infrastructure and Equipment:** this section refers to the existence of sufficient, reliable, and secure infrastructure (including equipment, software, information resources, internet connectivity, technical support, and physical space). Such infrastructure can encourage and facilitate innovative approaches to teaching, learning and assessment.
- **Area D | Continuing Professional Development:** this dimension examines whether the school supports and invests in the continuing professional development (CPD) of its staff at all levels. CPD can

support the development and integration of new teaching and learning methods that use digital technologies to improve learning outcomes.

- **Area E | Pedagogy – Support and Resources:** this area refers to the readiness to use digital technologies for educational purposes through the improvement and innovation of teaching and learning methods.
- **Area F | Pedagogy – Implementation in the Classroom:** this section relates to the integration of digital technologies into teaching practice, which involves the improvement and modernisation of teaching and learning methods.
- **Area G | Assessment Practices:** this dimension refers to the actions that schools might consider to move progressively from traditional methods of assessment to a broader range of practices. This range could include technology-enhanced approaches to assessment that prioritise learner engagement, personalisation, and authenticity.
- **Area H | Learners' Digital Competence:** this area addresses the set of skills, understanding and attitudes that enable learners to use digital technologies confidently, creatively, and critically.

The data collected in all the dimensions mentioned above provide an opportunity to possess a holistic view of digitalisation in the educational organisation and to take action to adopt a digitalisation strategy. Some countries, such as Spain, have decided to make it compulsory to have an institutional digitalisation strategy, and all educational centres must develop a digital plan.

In the case of VET institutions, the SELFIE tool has a version adapted to the DUAL model,

called SELFIE Work Based Learning (SELFIE WBL). It is adapted to the needs of work-based learning environments and ecosystems. SELFIE WBL was launched during the second edition of October 2021 SELFIE Forum. The initiative started in 2018 with a feasibility study and the development began in January 2020, with a collaborative process involving stakeholders and end users to ensure that the tool would meet the real needs of VET institutions and employers working in the DUAL model. After several workshops, a testing phase was carried out from September to December 2020 in nine European countries: France, Germany, Hungary, Poland, Romania, Georgia, Montenegro, Republic of Serbia, and Türkiye. In total, around 35,000 participants from around 150 vocational schools and 250 companies took part in the pilot programme.

3. METHODOLOGY

3.1 Aims

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 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).

3.2 Case studied

The Public Integrated Vocational Training Center CIFP TXURDINAGA LHII is located in Txurdinaga, a district of the city of Bilbao. Together with the neighbourhood of Otxarkoaga, it forms the 3rd district. Txurdinaga has more than 16,000 inhabitants, out of more than 25,000 inhabitants in the district. The population of Txurdinaga is about 48% male and 51% female. With an area of 3.90 km², it is a district with a medium-high population density (around 6,500 inhabitants/km²). This is slightly lower than the average for Bilbao (which is 8,500 inhabitants/km²), and the population has fallen in the last ten years from almost 18,000 inhabitants. The centre is located on a large site of around 15,000 m², surrounded by trees and green areas.

The main activity of the CIFP TXURDINAGA LHII is vocational training, both initial and employment training, with courses for employees and the unemployed. Each course varies according to the mandate given by the Ministry of Education, accredited with the certificates of professionalism associated with the professional areas that the centre has.

The current regulated training offer of the centre consists of seven professional areas:

- Administration and management
- Commerce and marketing
- Electricity and electronics
- Energy and water
- Computing and communications
- Chemicals
- Social and community services

A total of 12 intermediate and advanced training cycles are offered, as well as two specialisation courses, the latter in the Computing and communications area. Some of these training cycles are taught in both Basque and Spanish

languages. Apart from the Social Integration Cycle and the Employment Training Courses, which are taught in the afternoon, the rest are taught in the morning.

The learners of the different cycles can participate in Workplace Training or DUAL not only in companies in the area, but also abroad, thanks to the Erasmus+ programme; in the same way, for the last two years there has been the possibility of participating in DUAL in the first year.

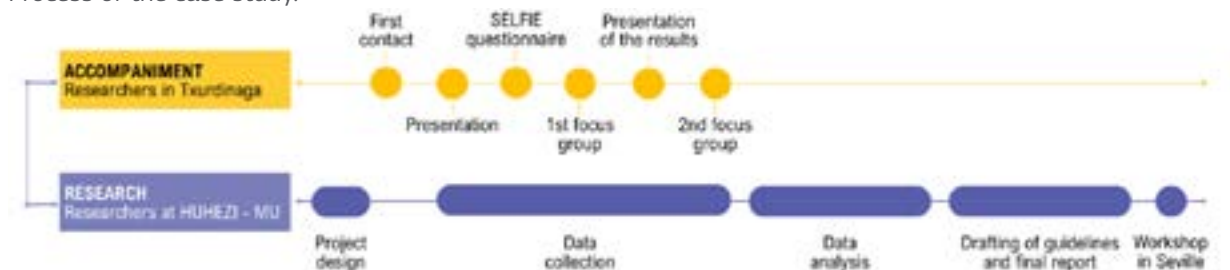
In addition, CFP TXURDINAGA LHII participates in several projects such as Agenda 2030, Ikaempresa, Erasmus+, Normalkuntza or UrratsBat, and in regional and national competitions such as EuskoSkills and Spain Skills. It also offers diverse services, such as a job bank for learners who have completed their studies at the centre, English language improvement courses, guidance services, or accreditation of professional competences.

Finally, it is important to highlight that it is one of the reference centres for innovation in the Basque Country, participating in numerous projects in collaboration with other centres and public and private entities, such as the Public University of the Basque Country, the Basurto Hospital, business associations, regional development agencies and numerous public centres, such as the CFP Elorrieta-Erreka Mari LHII in Bilbao or the CFP Ciudad Jardín LHII in Vitoria.

3.3 Process of the study

The case study we conducted was based on a twofold 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 CFPI Txurdinaga LHII. On the other hand, the research process and all the actions involved took place at the same time. Figure 22 reflects the entire process.

FIGURE 22.
Process of the case study.



Source: own elaboration.

In relation to accompaniment, six actions were conducted:

1. First contact: the research team contacted the centre to explain the process and the involvement in the case study.
2. Presentation: the researchers made a presentation to the teacher staff so that they knew first-hand what they could expect from their participation,

and what the school would receive after participating in the process. In this session the teachers also answered an initial questionnaire about their first impressions of the process.

3. SELFIE WBL questionnaire: sessions were scheduled for learners, teachers, management team and company tutors to answer the questionnaire. The researchers

provided support with a double objective: to ensure data collection and to gather information on possible doubts about the questionnaire.

4. First focus group: in this session, the impressions of all the profiles involved were collected.
5. Presentation of results: the researchers made a presentation of the results extracted from the SELFIE WBL report to the teacher staff and the management team, with the aim of giving them feedback on the data collected through the SELFIE WBL questionnaire.
6. Second focus group: to conclude, another focus group was held with the same participants as the first focus group. The objective was to evaluate the full process.

In terms of research, five stages were distinguished:

1. Project design: the objectives were defined, and the relevant methodological decisions were made to carry out the case study. The centre where the study would be conducted was also selected.
2. Data collection: quantitative and qualitative data were collected in order to carry out the case study.
3. Data analysis: the data were analysed, carrying out a triangulation to understand the reality studied.
4. Drafting of guidelines and concluding chapter: based on the data analysis, the findings were identified in terms of the needs of the educational community of CFPI Txurdinaga LHII in relation to the SELFIE WBL questionnaire and its process. Guidelines for improving the experience were defined and the concluding chapter was drafted.
5. Workshop at the European Commission Joint Research Centre premises in Seville:

finally, a workshop took place in Seville with different VET experts to discuss, analyse, and fine-tune the SELFIE WBL users' guidelines. The feedback collected during this session was incorporated in the last version of the SELFIE WBL guidelines.

As can be seen in the explanation of the double process, the methodology proposed for this case study was mixed: both qualitative and quantitative data were collected. The quantitative data were collected from directors and teachers. In case of the qualitative data, all types of stakeholders were represented, but only some of them took part in the focus groups. The data collected were then triangulated to understand the implementation of the SELFIE WBL tool in the chosen case.

3.4 Analysis

3.4.1 Quantitative data collection and sample

The aim of the quantitative analysis is to identify the participants' perceptions before and after the expert assistance process. Therefore, the aim is to identify any significant changes in their perceptions and opinions in order to gain a full understanding of the impact of the implemented intervention. To this end, an online questionnaire was administered at the beginning and end of the process.

On the one hand, the 'First Feelings Questionnaire' was used at the beginning of the process, after an initial explanation of the tool. On the other hand, the 'Final Feelings Questionnaire' was used at the end of the process, after the entire process with the tool had taken place. The questionnaires remain consistent, differing only in the verb tense. In the first questionnaire, participants are asked to respond with future-oriented

considerations, imagining actions they have not yet taken. Conversely, the subsequent questionnaire instructs participants to reflect on past experiences, framing the questions as a retrospective exploration of processes they have already undergone. The questionnaire consists of 11 Likert scale questions ranging from 'strongly disagree' to 'strongly agree' and is divided into three sections: Tool (five questions), Sessions (two questions), and Process (four questions).

The first questionnaire was completed by 79 participants; 46 cases where the questionnaire was not fully completed were excluded. Thus, data were collected from 33 individuals (three members of the leadership team and 30 teachers). The second questionnaire was completed by 60 participants; 48 not fully completed cases were excluded. Thus, data were collected from 12 individuals (12 teachers).

3.4.2 Qualitative data collection and sample

The aim of qualitative data analysis is to understand the experiences of the different stakeholders within the educational institution during and after the process and to understand the underlying reasons for their responses. Consequently, a thorough understanding of the realities they encounter in an educational setting will be achieved by exploring their opinions. To this end, two different focus groups were conducted at the middle and the end of the process. A first focus group was conducted in the middle of the process and the participants discussed their experiences with the tool, the sessions, and the process. Another focus group was conducted at the end of the process to gain insight into their experiences throughout the process and to confirm the conclusions drawn in the previous focus group.

In preparation for the focus groups, a semi-structured script was developed with three sections: tool, sessions, and process. In the first focus group, more questions were asked in the 'tool' and 'sessions' sections than in the second focus group. However, the clearest conclusions emerged in the second session, where ideas from the previous session were revisited and certain issues were further nuanced. In addition, the completion of the process gave participants of this second focus group a comprehensive view of the journey undertaken, making it easier to draw more definitive conclusions and opinions about the process as a whole.

In terms of participation, it was originally intended that the same individuals would participate in both focus groups to gain insight into the process. However, it was not possible to get everyone to participate in both sessions. However, it is important to mention that all participants in the second session were present in the first session. Four learners, three directors, one teacher and one in-company trainer were present in the first session, whereas in the second session two learners, two directors and one teacher were able to participate.

3.4.3 Triangulation

There are three important aspects to analyse in the experience of using SELFIE WBL in the case mentioned: tool, sessions, and process. Therefore, all the quantitative and qualitative data were analysed based on these sections.

The research methodology adopted a triangulation approach to ensure a comprehensive and nuanced understanding of the phenomena under study. Triangulation involves the simultaneous use of multiple methods or data sources to corroborate findings, increase validity and provide a more robust interpretation of research results. In the

case of this study, the triangulation approach not only helps to analyse the experience of using SELFIE WBL in the case mentioned but also provides a broader overview of it.

The data were entered into JAMOVİ (version 2.3.21.0) for analysis. The results of the two questionnaires were compared by analysing the answers to the questions one by one. This was done by calculating the percentages of the first and second results. However, the results obtained could not be compared because some participants did not answer the questionnaire at the end of the process.

After data collection, the audio recordings were transcribed, categorised, and coded in

MAXQDA 2024 (version 24.1.0). The qualitative data analysis process involved a systematic examination of the transcriptions, focusing on three overarching sections: the tool, the sessions, and the process. Within these sections, specific categories emerged as key themes, highlighting several aspects of the participants’ experiences. By systematically categorising responses into these themes, the qualitative analysis aimed to uncover patterns, variations, and valuable insights. The process involved careful exploration of participants’ narratives to ensure a full understanding of their perspectives within the context of each identified category.

TABLE 10.
Sections and categories used in the analysis.

Sections	Categories
The tool	Understand the purpose of the tool
	SELFIE WBL questions
	Functionality and usefulness of the tool
The sessions	Communication of the objective of SELFIE WBL
	Data collection and analysis
The process	Expert support during the process

Source: own elaboration.

The triangulation process involved a careful comparison of the results of both quantitative and qualitative analyses. Points of convergence and divergence were explored, and the integration of findings from different data sources allowed for a broader interpretation of the research questions. Triangulation served as a methodological safeguard against the limitations of relying on one type of data alone. By corroborating quantitative trends with qualitative narratives, the study aimed to increase the robustness, reliability, and validity of the research findings.

4. RESULTS

4.1 The tool

4.1.1 Understand the purpose of the tool

Regarding the understanding of the objective of SELFIE, the results of the survey at the beginning of the process show that 78.7% of the teachers and the management team understood the objective of SELFIE WBL (24.2% strongly agree and 54.5% agree), while 15.2%

thought otherwise (9.1% strongly disagree and 6.1% disagree). The remaining participants tended to be neutral or indifferent.

According to the qualitative results, in the first focus group, a member of the management team mentioned knowing something about the topic but not much, as the idea of the tool's objective and digital competence intertwines. The following statement illustrates this result: 'I understand that as SELFIE, that is to see yourself, isn't it? The SELFIE WBL is in principle a self-diagnosis to see the digital competences of the centre.' Another member of the management team, who is also a teacher, mentioned understanding the objective, stating: 'Well, I, in my case yes, as a teacher, apart from how you explained it to us in the first session, then I read a little bit of information about it on the website'. Additionally, a teacher mentioned: 'Yes, I knew about it too; in fact, I had started an INTEF course called 'School's Digital Plan' and the tool they used was the SELFIE.'

In general, the coherence between quantitative and qualitative data is evident, as both indicate that most of the management team and teachers understand the purpose of the tool. However, the qualitative data reveal a diversity of perceptions of understanding, with some indicating a more limited understanding and others a clearer understanding.

Regarding the learners' understanding, the quantitative results show that the 27.3% of the teachers and the management team believed that the learners would understand the main objective of SELFIE WBL (27.3% agree). Meanwhile, the 33.4% thought that the learners would not understand (15.2% strongly disagree and 18.2% disagree).

In the qualitative results, it can be observed that, after completing the SELFIE WBL, the learners did not understand the purpose of the

tool: 'Researcher: Do you understand what the SELFIE WBL tool is for? Pupils: No, not much.

Pupil: To see a bit about opinions or what is used and what is not used in the school. Teacher: But it wasn't clear to you when they explained what it was for? Pupils: No, not very much.' In addition, the learners noted that if they had a clear understanding of the objective, they would have approached the use of the tool differently: 'But you don't do it in the same way as if you know what the SELFIE WBL is about or that it's a survey and fill it in. I think you think about it better when you answer it.'

Overall, the results show that most of the teachers and the management team seem to be sceptical about learners' understanding; 39.3% were unsure whether the learners would understand the objective. Therefore, the qualitative data support the issues reflected in the quantitative data, as the learners confirm that they do not have a clear understanding of the objective of SELFIE WBL.

4.1.2 SELFIE WBL questions

According to the quantitative data, 39.4% of the teachers and management team indicated that they knew how to fill in the SELFIE WBL questionnaire (6.1% strongly agree and 33.3% agree), while 39.4% believed otherwise (21.2% disagree and 18.2% strongly disagree). In relation to these results, 57.6% of the teaching staff and management emphasised that they could complete the survey without any help (42.4% agree and 15.2% strongly agree) and 24.3% thought this was not the case (15.2% disagree and 9.1% strongly disagree). In line with the learners, 15.1% of the teachers and management thought that the learners would be able to complete the SELFIE WBL without help (12.1% agree and 3% strongly agree), while 27.3% thought that they would not be able to do so. The rest were indifferent or neutral (15.2% disagree and 12.1% strongly disagree).

Regarding the qualitative data, one teacher commented that the questions were understandable: ‘Yes, I think so too. Besides, we started from another experience that was rather more complicated, laborious, and longer. So, this has been more comfortable, at least for me.’ Another teacher later confirmed what had been said: ‘Yes, I agree.’ According to the learners, they emphasised that the questionnaire was understandable.

About the learners, they emphasised that the questions were understandable, stating ‘Yes, they were simple.’ They also mentioned that they did not need the help of experts to fill in the questionnaire, but rather to understand the objective: ‘And reading the questions is easy to answer, but ... yes, but it had to make a lot of sense. Of course, we did not have the context.’

In agreement with the in-company trainers, the qualitative data showed that one of them identified weaknesses and challenges, emphasising that the questions in the SELFIE WBL did not make sense to him because he did not feel identified in the process: ‘I didn’t see the questions focused on us as in-company trainers, (...) because we are in some way a different entity. So, I do not think they were so much focused on us as in-company trainers, but rather on the teaching staff and the learner body.’

A member of the management team mentioned that the questions were generally understandable and easy to answer, but sometimes he had doubts: ‘Yes, I also agree that ... I mean, the way the questions were designed, they were easy to understand, [...] but I did have some difficulties with some of them. It is a centre with a wide variety of teachers, learners, and training cycles. And although there were certain levels, I had difficulties in some of them. I am talking about 80-90% of

them were simple’. Nevertheless, the member of the management team noted that he had difficulties in reflecting the transparency of the educational institution, since the reality was not the same in all departments: ‘There is a lack of detailed information that [...] in this department there is a terrible margin for action [...]. Moreover, in terms of accuracy of the average, we lose a little bit of that information. This happens to us in several surveys, results, and courses.’ However, he said that it was not necessary for him to have expert help to fill in the SELFIE WBL ‘Researcher: To fill in the selfie, you don’t think it is necessary to have an external help, is this corroborated, or do you need something to fill it in? Director: To answer the questions in the survey, no, it was quite easy to understand.’

In relation to this last point, the need to know the reality of the different departments, one teacher emphasised that in SELFIE WBL it is necessary to segment more according to the area or department in order to obtain more realistic results: ‘Sometimes it might be necessary to segment, sectorise a little more, because sometimes we can put the case that there is a disparity of knowledge depending also on the previous knowledge you have by the branch you have studied, by the profile of the learners and by the profile of the teachers’. In line with this, the learners also mentioned the need to differentiate the fields of study, as the implementation of digitalisation is not the same in all studies: ‘For example, we, who are computer scientists, the questions were too generic. Because, for example, we work with computers all the time. So, if we included technology in the questions, almost all of them were yes.’ A learner from another course made the same point: ‘(...) there were some questions that I say, this one may not suit our branch very well, but it could be answered, I would say.’

Taking into account the quantitative and qualitative data, the results show a significant divergence in the perceptions of the teaching staff regarding the learners' ability to complete the SELFIE WBL questionnaire. The quantitative data show that a substantial proportion of the teaching staff believed that learners would not be able to complete it independently. However, the qualitative data show that both the teaching staff, the management team and the learners had no difficulty in completing the questionnaire, as the questions were simple and understandable. However, one teacher did not understand the SELFIE WBL questions as he felt that he was not part of the process. Therefore, it could be concluded that the trainer did not understand the objective of the tool.

Furthermore, when filling in the questionnaire, all participants emphasised that it did not fully reflect the reality of their school due to the diversity of departments. Therefore, the management team, the learners and the teachers mentioned the need to segment the SELFIE WBL considering the study programmes or departments.

4.1.3 Functionality and usefulness of the tool

Regarding the functionality and usefulness of SELFIE WBL for the educational institution, the quantitative data show that at the beginning of the process, 45.5% of the management team and teachers thought that the tool would be positive for them (36.4% agree and 9.1% strongly agree), while 9.1% thought the opposite and the rest were indifferent or neutral (6.1% disagree and 3% strongly disagree).

The qualitative data showed that teachers found the tool helpful in understanding the digital reality of their institution, as they find it interesting to know how they are implementing

digitalisation in their school. Furthermore, they believe that it is a good starting point to reflect on the use of digital technologies and their usefulness in education. As one teacher pointed out: 'Yes, of course. I think that before making any decision you always must make a previous study, right? If you must create a project of what are the steps to follow in the next two or three years, then you do not have to know where you are.'

Nevertheless, some participants expressed doubts about its implementation. A teacher said that they were uncertain about when the process should be repeated, as the turnover of learners and teachers can be a challenge: '(...) it is true that sometimes the SELFIE WBL photos do not know to what extent, how often they should be taken. Because we work with a learner body that is generally in two years, taking out people who can do an intermediate cycle and then a higher grade cycle, but if we have a learner body of two years, it is not like in a high school that has a minimum of four, or six, or a primary school that has a minimum of six years. So sometimes this sometimes happens because of course, there is a lot of rotation, and therefore there is a lot of diversity every two years of teachers and learners, of course.' Nevertheless, one teacher noted the need to consider the temporality based on the objectives and actions defined in the school's digital plan, as the SELFIE WBL will help to understand how these actions and objectives are developed: 'This periodicity is also a little, yes; it would be conditioned a little to the school's digital project to the temporisation'.

Moreover, one teacher and learners emphasised that the results of the SELFIE WBL could vary from month to month, as the learners were not at the same stage. The teacher mentioned the following: '(...) the vision will change substantially, not so much at the end

of the course, but their vision of how things are working will be completely different at the beginning of the course in September, than even in the middle of the course. That is to say, their evolution will be as much a consequence of how they are taught and of good teaching as of their desire to learn.' In line with this, one learner said the following: 'Also as the content changes from one quarter to another, it could be done quarterly because in the first part of the course we do not touch the same thing as the last. Therefore, at the beginning, there may be things that you see and this is also valid, but then you go deeper into it, in the third, for example, and something could change. So, I do not know, at the beginning you can get an image, it can give you a feeling, but then until you go deeper into it you do not really check how it works if everything is working well.'

All the data provide a general insight into the perception of the usefulness of the tool. Overall, the participants are in favour of its usefulness and see it as an opportunity to improve the understanding of the reality of the institution. However, they did express some concerns about the variability over time.

4.2 The sessions

4.2.1 Communication of the objective of SELFIE WBL

Regarding the support of experts to explain the purpose of the tool, 57.6% of teachers and management team members thought it was appropriate for them (39.4% agree and 18.2% strongly agree), while 15.1% thought it was unnecessary (12.1% disagree and 3% strongly disagree). As for the learners, 57.6% of the teachers and management members thought that learners would need help to understand the purpose of SELFIE WBL (36.4% agree and

21.2% strongly agree), while 9.1% thought otherwise (6.1% disagree and 3% strongly disagree). The rest were indifferent or neutral.

The qualitative data show that teachers felt it was necessary to have experts present to explain the purpose and use of the SELFIE WBL, as they felt that a centralised explanation would be beneficial to all. One teacher, who is also part of the management team, said the following: 'It is true that just before some questions were not understood and when ... Well, not the questions, but the objective. Then when you explained it to us, a lot of people said, ah, okay, this is what it is for. So, the explanation to the faculty was good for us.' Another teacher said the following: '(...) I do find it interesting that there are people who know what it is and what it is for. Because if you, one of you or both of you, tell us here, the ... We are going to do the three teachers that we are. We count the 50 teachers and the 70 in-company trainers and so on. So, it is quite diluted. So, the fact that there is a centralised explanation, so to speak, always makes ... I think it is better to reach the same conclusion.'

Regarding the communication with the in-company trainers, the person in charge of coordinating the SELFIE WBL process mentioned that it is necessary to know the reality of each department when communicating with the in-company trainers, as each one has its own way of doing it: 'In that sense, I am remembering a little bit that maybe the in-company trainers can also say something about how the relationship with the in-company trainers in the different departments works. For example, in IT we have digitalised the complete process, the digital signature, the management of the application and everything. The same in other departments because they take the papers to sign, they take the papers to sign.' In addition, one teacher mentioned that it was difficult to

hold a face-to-face meeting with teachers to explain the process and the objective, and that an online meeting would be the best option, as it would provide them with a simple guide: 'Of course it cannot be face-to-face (...) I mean, to go to the company and visit the learner who is doing the internship is a little bit ... to look for the ideal moment when he/she can, when he/she has five minutes to attend to you, etc. ... That is to say, to make him or her come on top of that. Therefore, I think that whatever it is must be online. Surely online with an even simpler guide than what we are going to need or a five-minute mini video.'

Regarding the communication with the learners, the qualitative data show that the online explanation was not sufficient and, in many classes, the objective of SELFIE WBL was not properly understood due to some technical problems. One learner mentioned the following: 'From my point of view, as I believe it has been in my class, many of my classmates will agree. Moreover, the thing is that ... For us it was too fast, suddenly a little before we were told that there was going to be a meeting of a project called SELFIE WBL about digitisation. In addition, after that, we asked for a webpage, and we had the version. For example, in my class, there was a problem and that is that you hear through the projector. Between the distortions of the video call and the projector, you could not hear well, and at the minimum that a learner was talking a little bit, the communication was completely broken. So, in our class, for example, it was very confusing because of that, because we could barely hear the presentation.' Finally, another learner commented that a more detailed explanation was needed to understand the objective and to make their answers meaningful: 'In principle, a more detailed explanation of what the SELFIE WBL would be because at the time I remember

that we were in class suddenly the teacher came and the projector let us do a survey, I do not know what and we saw on the screen where you appear you heard a little but did not hear very well and we followed the survey'.

Regarding this explanation, the learners commented that a face-to-face explanation would be more convenient to understand the purpose of the tool: '(...) because, of course, if a person comes, if he is in person, it also depends on how much you want to listen to him. Therefore, if there is a person in person, you are going to pay more attention to them than if you see them on a screen. Because, apart from the fact that we have all the computers in the ... Moreover, they tell us, like us, they told us minutes before that there is going to be a talk, so you say, well, well, a talk. In addition, let us see, we have all been learners, right? And so, sometimes you pay more attention than to other things ...' Another learner suggested that an explanatory video could be a good option: 'Instead of a call, let it be a video that you can play it several times, even if it is not clear to someone the first time, they can manipulate it as they wish.' In line with this, a teacher, who is also part of the management team, affirmed the idea of the video: 'A simple video explaining it and that all teachers can play it in class when they can.'

However, learners also mentioned that teachers could be a source of information when explaining the purpose of the tool: 'Or explain it to the teachers well and that before or after the video-conference or video call if someone is not clear that the teachers have the ability to re-explain what the tool is'. However, the coordinator said that this could be a challenge as it is very difficult to ensure that all teachers have attended and understood the explanation and it would be better to have an external explanation: 'The thing is that, well, it has

actually happened to us that, on the day of the SELFIE, there was a teacher who didn't come because he or she was on duty, had an exam, wasn't there or whatever. Of course, that teacher who was not there, I say that teacher because I do not know how many could have been absent, but they are the ones who had to give the SELFIE WBL to the learners. So, in the end, if there is something objective and well explained that can be useful to all the teaching staff, perhaps it is easier than if a teacher comes in as a substitute and they have been told that they have to put in the SELFIE WBL and they don't know at the last minute (...) this type of thing prevents misunderstandings or people who don't understand what the tool is for'.

The results converge on the positive perception of teachers and the management team towards the presence and support of experts in contextualising the SELFIE WBL. A centralised explanation is considered valuable to facilitate the overall understanding of the tool for teachers, learners, and management team members. However, when communicating the objective to teachers and learners, it is noted that there were difficulties in understanding the objective of the tool and it can be seen that online sessions were not suitable for explaining the objective. In addition, the need to understand the reality of each department is identified when communicating with teachers, as this can also have an impact. Finally, the need for expert guidance and clarity is emphasised to ensure effective implementation and mutual understanding across the educational community.

4.2.2 Data collection and analysis

Regarding the need for experts in data collection and analysis, the survey results show that at the beginning of the process, 42.4% of

teachers and management members thought it was necessary (33.3% agree and 9.1% strongly agree), while 9.1% disagreed (3% disagree and 6.1% strongly disagree). Regarding the need to interpret the results and formulate objectives and actions, 72.8% of teachers and management team members felt that the presence of experts was appropriate (including 57.6% agree and 15.2% strongly agree), while 6% felt otherwise (3% disagree and 3% strongly disagree). The rest were indifferent or neutral.

The qualitative data show that among teachers, management team members and trainers, the presence of experts is appreciated and needed. The trainer said the following: 'Of course it is. Yes, without a doubt. We can all have knowledge of breaking down and scratching on the results but sometimes the knowledge is more in one area than in another and from my point of view it is much healthier and real to have a mission of how those results must be interpreted.' In line with this, the SELFIE WBL school coordinator noted that the explanation of the report had been interesting because the factors that were more different among the members were highlighted: 'I think it was quite interesting because by giving us guidelines of things that were striking because you just give us several examples of look, this is what the management team thinks and this is what the teaching staff thinks or this is what the learners think and this is what the teaching staff thinks and there is a lot of variation. Well, this is the most noteworthy thing in each category, but also that there are certain things that are striking can help us to say hey, let us get started. ... Not to start there, right? However, to say, hey, well, that is one way of interpreting it, right? Well, I mean, we, well ... people from the digitalisation team are perhaps the ones who are going to put their hands on it.'

In conclusion, the qualitative findings support the quantitative findings, as the data indicate that a significant percentage of teachers and the management team see the need for experts to collect and interpret data and to set targets. In addition, the qualitative data emphasise that experts bring a specialised perspective, and their contribution can be more objective. It can therefore be concluded that participants recognise the need for experts to ensure a more comprehensive and accurate assessment of the state of digitalisation in the institution.

4.3 The process

4.3.1 Expert assistance in the process

Following the support of experts in understanding the process of appropriate use of the SELFIE WBL tool, quantitative data show that 72.7% of teachers and management team members felt that it was necessary (54.5% agree and 18.2% strongly agree), while 6% felt that it was not necessary (3% disagree and 3% strongly disagree).

Qualitative data show that the management team and teachers claim that the presence of experts is crucial for a good understanding of the process, as they attach importance to the correct use and implementation of SELFIE WBL. This is a statement made by a member of the management team: 'Yes, the process is clearer [...] I think we could do it without that, but I think the process is much clearer.' In line with this, one teacher commented that the presence of experts was key to activating and engaging participants: 'I believe that it contributes more and people will do it in a more conscious and conscientious way if there is a personal support behind it, because it is the usual email. In this way it is given more presence, more importance.'

As far as the coordinator is concerned, managing the meetings and appointments to implement the SELFIE WBL has been a challenge: 'I think that the issue of seeing that it has not been so complicated but finding the exact dates for everyone to participate is not so complicated (...).' Correspondingly, a teacher who also participates in some functions of the management team noted that the presence of experts in the process was beneficial and really helpful for the coordinator: 'Yes, yes, it helps to follow step-by-step, not to lose one thing that people do, that if we had had to do it on my own, for example, and had tried to convince people to meet in a cloister, why, why I say so, why do I say so. Nevertheless, well, having to activate the process, for example, also helped me a lot, it also helped me a lot to be in these questions, see if you want to add them here with the date? It seems like it is a bit of a joke, but maybe I would have arrived and there would have been things that and here what do I have to put, you know? I would have got stuck somewhere ...'

On the other hand, the coordinator suggested as an improvement to have a detailed guide to understand all the steps of the process: 'I think a guide. [...] knowing that if I follow the steps I am going to do well. [...] You need 80% participation, or you need to have a meeting of all the teachers, or it would be convenient, that kind of thing'. In line with this, a teacher emphasised the need to have information that could be viewed asynchronously and stressed the importance of adapting the language to the audience: 'The same thing you have done. That is, to say – you need this – but in a way that can be done asynchronously (...) and a guide, a guide or some explanatory videos that are not put in a context of language and semantics in which people get lost (...). So, it must be one thing, these pills that are 'The basic concepts'

that must be explained in a straightforward way to get people hooked.’ In addition, the same teacher added that this guide could contain information to be given to the rest of the participants: ‘A simple thing that can be seen, that can be seen by the main facilitator and then by the rest of the people who are involved in the process – teachers and learners’.

For this reason, the person who was involved in coordinating the SELFIE WBL process said that an infographic or presentation would be interesting to explain the process and the objective to the rest of the participants: ‘In fact, maybe having an infographic can be a resource that the person taking the SELFIE WBL at the centre can use. They could use it. Alternatively, a presentation, right? However, maybe so that the learners and the teaching staff can also get a bit of an idea; to say, hey, this is how we are going to do this process. Moreover, the same in a cloister, right? So that the teaching staff, above all, can also get an idea: first, we are going to have an initial session where we are going to do the ... This one, and then we will explain the conclusions. It is also interesting for the teaching staff to get an idea. So that the teachers know. We do not have to do it, do we? Therefore, that it is not just for the digitalisation team. Or even for the learners as well.’

In general, the results indicate a positive view of the presence of experts in the process. Their help was crucial for understanding and carrying out the implementation of SELFIE WBL, providing the necessary support to the process coordinator, and helping to activate the participating members. However, when experts are not available, a detailed guide is seen as necessary for the coordinator to know what to do and when. In addition, having prepared resources to explain the process and objectives to other participants is seen as interesting.

5. GENERAL GUIDELINES

Based on an analysis of all the information collected in a case study on the use of SELFIE WBL in the Basque Country Community, carried out at the Txurdinaga Vocational Training Centre, we believe that the guidelines and recommendations can be divided into two groups: firstly, those relating to the tool itself, the SELFIE WBL questionnaire; and secondly, those relating to the process of using the tool. These latter guidelines include the proposals for improvement collected in the workshop carried out in Seville, with experts and stakeholders from the VET system.

Below, we discuss the guidelines to shed light on possible improvements.

Regarding the questionnaire, we suggest the following improvements:

- When collecting profile-related data, we suggest changing ‘sex’ to ‘gender’ and adding two response fields: ‘non-binary’ and ‘not applicable.’
- The following terms need to be defined, so we suggest specifying each one in the question to which it relates:
 - **Blended learning:** it is not clear whether this refers to DUAL learning or to hybrid or blended learning (the combination of face-to-face and online learning). What is meant needs to be clarified by providing an explanation the first time it appears in a question.
 - **BYOD:** although an explanation of this acronym appears below the question in which it appears, it would be more efficient to explain it as part of the question.

- **The SELFIE WBL tool:** one of the last questions that the learners have in their questionnaire is related to the SELFIE WBL tool in order to evaluate the tool itself. However, the learners did not understand what the tool was. Therefore, we suggest changing ‘the SELFIE WBL tool’ to ‘a questionnaire that we have just used (the SELFIE WBL tool).’
- **‘Providers’:** In the Spanish version of the SELFIE WBL questionnaire, the word ‘providers’ (proveedores) appears in question C17. The kind of providers to which the tool refers is unclear.
 - **Specific software:** the type of software is not clear. It is recommended to provide examples.
 - **eTwinning:** participants did not know what this meant due to their lack of knowledge about the project.
- We propose to add the possibility of differentiating or filtering the data by VET families. The idea would be that the tool would be able to provide not only a global vision of the school, but also a view by VET family, which would be helpful in defining actions adapted to the specific needs of families (due to their own contexts). Ideally, considering that there are different VET families in each school, the tool would have the possibility of customising each SELFIE WBL exercise for families, so that it would be able to provide a general report or separate reports by family.
- We also propose to consider the possibility of justifying some questions qualitatively. That is, the customisation of the tool would offer the possibility of setting boxes to collect qualitative data.

Finally, regarding the report generated by the SELFIE WBL tool, in this case, it did not reflect the data from the teachers’ responses. This may

be due to an update of the application. However, we feel it is important to highlight this issue as the participants reported the lack of this data.

We used the steps suggested on the SELFIE WBL platform as a basis for designing the process. Beyond the use of the SELFIE WBL tool, we focused on designing a process that specifies what each person involved needs to do/know during the process. In this way, we believe that schools will be able to make meaningful use of the results of the questionnaire. The process consists of four stages:

1. Contextualising and activating the process
2. Data collection
3. Data analysis
4. Next steps

In the analysis of the SELFIE WBL website, we found that resources (including guides, videos, and checklists) are provided to help schools implement the tool. However, we believe that the resources provided focus only on the implementation of the tool, without providing a holistic view of the process. According to the data analysis carried out in the SELFIE WBL case study in the Basque Country Community, the educational community sees an urgent need for an overall view of the process to involve the whole group and make the most of this tool as a lever for the digital transformation of the school. This involves adapting the existing videos and checklists. It is also important to translate the above-mentioned resources (Spanish and Basque) to improve their understanding and acceptance.

5.1 Guidelines by profiles

In the following, the recommendations for the process are classified according to the profiles involved. Each section refers to a profile and what it should do at each stage of the SELFIE WBL process.

5.1.1 Management team

The management team should be involved throughout the process. The following points refer to the actions that this team should take at each stage:

Stage 1: Contextualisation and activation of the process

- **1.1. Select the coordinator:** the management team will select the appropriate person to be responsible for leading the process and being involved in it. Here are some criteria that schools should consider. The coordinator should ...
 - Have an advanced level of digital competence (referring to DigCompEdu).
 - Know in depth the SELFIE WBL project and the DigCompOrg framework.
 - Have leadership and communication skills.
- **1.2. Provide context to the coordinator, plan the process and register:** in this step, the management team, with the assistance of the coordinator, will gather information about the process. That is, they must understand the purpose of SELFIE WBL and know how it can benefit the school. In other words, they must be able to answer the following questions:
 - What is the purpose of SELFIE WBL?
 - How can it benefit the school?
- In addition, before registering, the process must be adapted to the circumstances of the school and the coordinator and management team must plan a strategy to clarify how they want to design the process. For this purpose, the following questions must be answered:
 - Will the process be applied to the whole school or only to a specific department or area?
 - How will the participants (management team, teaching staff, learners, in-

company trainers) be involved in each step and phase?

- At what point will context be provided to the management team, teaching staff, learners, and in-company trainers?
- When will the questionnaires be distributed?
- When will the report be created?
- **1.3. Personalise the questions on the SELFIE WBL tool:** the SELFIE WBL tool provides the option to add additional questions to obtain a more holistic view of the digital activities and processes of the school. In that case, the management team will assist the coordinator in checking the questions chosen for inclusion on the questionnaire.
- **1.4. Contextualise the process:** the coordinator will think about how to provide context for the process that is being carried out and the management team will offer the resources the coordinator needs. Special attention needs to be paid to communication with company tutors, who need a more exclusive explanation in order to be involved.

Stage 2: Data collection

- **2.1. Complete the SELFIE WBL questionnaire:** the management team should fill in the questionnaire received from the coordinator via the institutional email or the existing email list.

Stage 3: Data analysis

- **3.1. Obtain the results and analyse the report:** once the time period for completing the SELFIE WBL questionnaires has closed, the coordinator will download the report from the platform and monitor the results with the management team. It is important to identify strengths and points for improvement to begin to

identify key issues to discuss with the other representatives from the school. A SWOT analysis can be especially useful.

- **3.2. Organise the discussion and take action:** based on the SWOT analysis, the management team they will organise some sessions with the representatives of the participants (all the profiles). The aim of these sessions will be to contrast the ideas of the SWOT analysis and to explore them in depth. In addition, to organise the discussions, the management team will answer the following questions:
 - What issues do we wish to discuss with the teaching staff, learners, and in-company trainers?
 - When will these discussions take place? Will we meet with all representatives at the same time?

Stage 4: Next steps

- **4.1. Continue making progress:** after carrying out the discussions, identifying, and understanding the needs of the people involved in the school, the management team will begin to design the school's Digital Plan. In this plan, the idea would be to set short, medium, and long-term objectives that must be realistic and appropriate for the circumstances of the school. It is also essential to propose actions to be taken to achieve these objectives. Ideally, after the school's Digital Plan has been designed and depending on the proposed objectives, an analysis would be conducted to determine whether the actions proposed to achieve the objectives are being carried out. For this purpose, it is important to begin the process again to update the objectives and actions in the school's Digital Plan.

5.1.2 Coordinator

Once selected, the coordinator will be involved throughout the process and will take the lead. The following points refer to the actions that this person should take at each stage:

Stage 1: Contextualisation and activation of the process

- **1.2. Provide context to the coordinator, plan the process and register:** in this step, the coordinator, together with the help of the management team, will gather information about the process. That is, they must understand the purpose of SELFIE WBL and know how it can benefit the school. In other words, they must be able to answer the following questions:
 - What is the purpose of SELFIE WBL?
 - How can it benefit the school?
- In addition, before registering, the process must be adapted to the circumstances of the school, and the coordinator and management team must plan how they want to design the process. For this purpose, the following questions must be answered:
 - Will the process be applied to the whole school or only to a specific department or area?
 - How will the participants (management team, teaching staff, learners, in-company trainers) be involved in each step and phase?
 - At what point will context be provided to the management team, teaching staff, learners, and in-company trainers?
 - When will the questionnaires be distributed?
 - When will the report be created?
- After contextualising and planning the process, the coordinator will register on the SELFIE WBL platform.

- **1.3. Personalise the questions on SELFIE WBL:** after registering, the coordinator will think about what questions are appropriate for inclusion on the questionnaire since the SELFIE WBL tool provides the option to add additional questions in order to obtain a more holistic view of the digital activities and processes of the school. This individual should check the questions chosen with the management team. Moreover, the coordinator will then choose the dates on which questionnaires will be available to those participating in the process. It is especially important to choose the dates carefully as once they are selected; they cannot be changed.
- **1.4. Contextualise the process:** the coordinator will think about how to provide context for the process that is being carried out. For this purpose, the coordinator must be able to answer the following questions:
 - How and when will context be provided to the participants? Will all participants receive this information at the same time?
 - Will any resources be used to contextualise and explain the process?
 - How do we want to involve the companies in the process (meetings, tutorials, calls ...)?

Stage 2: Data collection

- **2.1. Complete the SELFIE WBL questionnaire:** in this step, the coordinator will send the links created on the SELFIE WBL platform to each participant. Here are some recommendations for the various groups:
 - Management team and teaching staff: use the institutional email and an existing email-list.

- Learners: it is better if the teacher sends the link to them.
- In-company trainers: it is recommended that the coordinator sends a personalised email to each in-company trainer.

Stage 3: Data analysis

- **3.1. Obtain the results and analyse the report:** once the time period for completing the SELFIE WBL questionnaires has closed, the coordinator will create the report on the platform and monitor the results with the management team. It is important to identify strengths and points for improvement to begin to identify key issues to discuss with the other representatives from the school. A SWOT analysis can be particularly useful.
- **3.2. Organise the discussion and take action:** based on the SWOT analysis, the coordinator will organise some sessions with the representatives of the participants (all the profiles). The aim of these sessions will be to contrast the ideas of the SWOT analysis and to explore them in depth. In addition, to organise the discussions, the management team will answer the following questions:
 - What issues do we wish to discuss with the teaching staff, learners, and in-company trainers?
 - When will these discussions take place? Will we meet with all representatives at the same time?

Stage 4: Next steps

- **4.1. Continue making progress:** after carrying out the discussions and identifying and understanding the needs of the people involved in the school, the management team will begin to design the school's Digital Plan. In this plan, the

idea would be to set short, medium, and long-term objectives that must be realistic and appropriate for the circumstances of the school. It is also essential to propose actions to be taken to achieve these objectives. Ideally, after the school's Digital Plan has been designed and depending on the proposed objectives, an analysis would be conducted to determine whether the actions proposed to achieve the objectives are being carried out. For this purpose, it is important to begin the process again to update the objectives and actions in the school's Digital Plan. The role of the coordinator will be to lead, together with the coordination team, the development of the school's Digital Plan.

5.1.3 Teaching staff

The teaching staff is not involved throughout the process: its participation is reduced to three stages. The following points refer to the actions that teachers should take:

Stage 1: Contextualisation and activation of the process

- **1.4. Contextualise the process:** the coordinator will consider how to provide context for the process that is being carried out and the management team will offer the resources needed by the coordinator. Teachers will be involved in the contextualisation by receiving information but will also play an active role in explaining the purpose and stages of the process to the learners and help the coordinator understand the context.

Stage 2: Data collection

- **2.1. Complete the SELFIE WBL questionnaire:** the teaching staff should fill in the questionnaire received from the coordinator via the institutional email or the existing email list.

Stage 3: Data analysis

- **3.2. Organise the discussion and take action:** based on the SWOT analysis, there will be some sessions with the representatives of the participants (all the profiles). The aim of these sessions will be to contrast and deepen the ideas of the SWOT analysis. Teachers will take part in the discussion, present their point of view, give feedback, and make proposals for improvement.

Stage 4: Next steps

- **4.1. Continue making progress:** after carrying out the discussions, identifying and understanding the needs of the people involved in the school, the management team will begin to design the school's Digital Plan. In this plan, the idea would be to set short, medium, and long-term objectives that must be realistic and appropriate for the circumstances of the school. It is also essential to propose actions to be taken to achieve these objectives. Ideally, after the school's Digital Plan has been designed and depending on the proposed objectives, an analysis would be conducted to determine whether the actions proposed to achieve the objectives are being carried out. For this purpose, it is important to begin the process again to update the objectives and actions in the school's Digital Plan. The role of the teachers will be to get involved actively in relation to the school's Digital Plan, getting involved in the actions that implies teacher staff.

5.1.4 Learners

Regarding the learners, as in the case of teachers, they will also not be involved throughout the process: their participation is reduced to the same three stages. The following

points refer to the actions that learners should take:

Stage 1: Contextualisation and activation of the process

- **1.4. Contextualise the process:** the coordinator will consider how to provide context for the process that is being carried out and the management team will offer the resources needed by the coordinator. Learners will be involved in the contextualisation by receiving information from teachers.

Stage 2: Data collection

- **2.1. Complete the SELFIE WBL questionnaire:** learners should fill in the questionnaire received from their teachers via the institutional email or the existing email list.

Stage 3: Data analysis

- **3.2. Organise the discussion and take action:** based on the SWOT analysis, there will be some sessions with the representatives of the participants (all the profiles). The aim of these sessions will be to contrast and deepen the ideas of the SWOT analysis. Learners will take part in the discussion, present their point of view, give feedback, and make proposals for improvement.

5.1.5 In-company trainers

As is the case with teachers and learners, the in-company trainers will also not be involved throughout the process: their participation is reduced to the same three stages. The following points refer to the actions that in-company trainers should take:

Stage 1: Contextualisation and activation of the process

- **1.4. Contextualise the process:** the coordinator will consider how to provide context for the process that is being carried out and the management team will offer the resources needed by the coordinator. In-company trainers will be involved in the contextualisation by receiving information from teachers who are in contact with them.

Stage 2: Data collection

- **2.1. Complete the SELFIE WBL questionnaire:** in-company trainers should fill in the questionnaire received in a personalised email from the coordinator.

Stage 3: Data analysis

- **3.2. Organise the discussion and take action:** based on the SWOT analysis, there will be some sessions with the representatives of the participants (all the profiles). The aim of these sessions will be to contrast and deepen the ideas of the SWOT analysis. In-company trainers will take part in the discussion, present their point of view, give feedback, and make proposals for improvement.

6. CONCLUSIONS

This section discusses and interprets the SELFIE WBL case-study results and findings in the light of the objectives presented in this chapter.

6.1 Limitations

This case study faces several limitations that must be acknowledged to provide a comprehensive understanding of the findings and their implications.

Firstly, it was not possible to compare quantitatively the impact of the process on teachers and management team members because of very low participation in the second survey, as it was difficult to get the involvement of participants in the second round. As the variability in participation could affect the direct comparison of quantitative results, only the results of the first survey were considered in the analysis. Given the challenge of the different sample sizes of the surveys, additional emphasis was placed on the qualitative data and analysis. In this study, the qualitative analysis provided a richer and more detailed insight into the participants' perceptions and was helpful in compensating for the quantitative limitation.

Moreover, it was not possible to ensure the participation of the in-company trainer in the second focus group, as he was not available. In general, more information is needed about the experiences of the trainers to understand their reality during the process.

Furthermore, regarding the sample representation, the participation of the sample did not encompass all branches of study within the VET centre under investigation. This limited scope restricts the diversity of perspectives and experiences captured, potentially leading to a skewed understanding of the broader educational environment within the institution. Consequently, the results may not fully reflect the heterogeneity of the reality of the centre, thereby limiting the generalisability of the findings across different fields of study.

In addition, the timing of the sessions, dictated by the centre's schedule, had a significant impact on participation and the attitudes of the participants. Sessions held in the afternoon experienced lower attendance rates and were characterised by more critical and negative

attitudes among participants. This variation in engagement and disposition could have influenced the data collected, introducing a potential bias that may affect the reliability of the outcomes.

Finally, as a case study, the conclusions drawn are inherently specific to the particular context and conditions of the VET centre studied. This specificity limits the ability to generalise the findings to other settings or populations. Furthermore, the guidelines proposed based on these conclusions are context-dependent and may not fully address the needs of the entire community. The unique characteristics and constraints of the studied setting must be considered when interpreting the results and applying the recommendations.

6.2 Overall findings

The first objective of this case study was to identify the perceptions of all the profiles involved in the process (director, teachers, learners, and trainers) regarding the SELFIE WBL tool, the sessions conducted by experts, and the process of its implementation. Considering the results of the triangulation, general conclusions have been drawn.

Although teachers and the management team understood the objective of the SELFIE WBL tool, there were varying interpretations regarding its purpose and intended outcomes. Some viewed it as a tool for immediate practical application, while others saw it as a long-term strategic instrument. This divergence in understanding highlighted a fundamental issue in the communication of the tool's aims. Regarding the learners and teachers, it was concluded that the objective was not clearly understood by these groups. The learners, in particular, appeared to be unsure as to the relevance of the tool in their

own educational experiences and future career paths. This lack of clarity led to confusion and inconsistent responses. To ensure more accurate and meaningful participation in the survey, additional clarification and explanation were deemed necessary.

Therefore, it is concluded that there were difficulties in communicating the objective to all participants in a way that was understandable to all. This could involve more detailed introductory sessions, comprehensive guidance materials and ongoing support throughout the survey process. By providing these resources, all stakeholders involved would be better equipped to understand the tool's objectives, thus enabling them to provide more relevant and reflective responses.

In addition, all participants emphasised the need to segment the SELFIE WBL into study families or departments to understand the reality of each one.

Regarding the questions contained in the SELFIE WBL tool, it is concluded that they are generally understandable for all participants, obviating the need for external assistance to complete them. The language used is clear and accessible, allowing participants to navigate the questions without difficulty. However, while the questions themselves are straightforward, correctly answering them necessitates a comprehensive understanding of the tool's overarching objective, as highlighted above. Without this contextual understanding, participants may struggle to provide responses that accurately reflect their experiences and insights.

Moreover, all participants underscored the importance of segmenting the SELFIE WBL tool into different study families or departments. This segmentation is crucial for capturing the unique realities and challenges faced by each academic or field of study. Different study

families or departments often have distinct educational practices, goals, and environments. Therefore, a one-size-fits-all approach may not be adequate for obtaining detailed and actionable insights. Segmenting the tool would enable a more nuanced analysis, allowing for the identification of specific needs and areas for improvement within each department, as each one has its own priorities and concerns. By tailoring the questions to address these specific contexts, the SELFIE WBL tool could generate more precise data, which in turn could inform targeted interventions and strategies.

Regarding the functionality and usefulness of the SELFIE WBL tool, participants found it suitable for assessing the digital reality of the institution. They acknowledged that the tool provides valuable insights into the current state of digital integration and helps identify areas for improvement. This usefulness stems from its comprehensive nature, which covers various aspects of digital competence and practice within the institution. However, despite recognising its appropriateness, some participants expressed concerns about the optimal frequency of its deployment.

These concerns are linked to the broader digital strategy and objectives outlined in the institution's digital plan. As one teacher pointed out, the frequency with which the tool should be used depends largely on the specific goals and milestones set within this plan. A critical factor in determining the appropriate frequency is the participants' understanding of the tool's objectives. If the objectives of the SELFIE WBL tool are clearly understood, it becomes easier for stakeholders to determine when subsequent assessments should occur. This understanding allows them to align the tool's use with the institution's digital plan, ensuring that the timing of assessments supports the overarching goals. This involves not only explaining the

tool's immediate goals, but also how its use fits into the long-term digital strategy of the institution. Clear communication will enable participants to make informed decisions about the frequency of the tool's deployment, ensuring that it remains a useful and relevant instrument for ongoing digital development. In fact, the key is not merely the SELFIE WBL tool itself but rather understanding it as a fundamental pillar for designing, implementing, and executing the institution's digital plan to achieve a meaningful and relevant digital transformation of the centre.

Finally, regarding the presence of experts, their assistance was highly valued by participants. Experts played a critical role in the collection, analysis, and interpretation of data, ensuring that the information gathered was accurate and comprehensive. Their expertise allowed for a more objective and precise understanding of the results, which was essential in formulating well-informed objectives based on the findings. Experts brought a level of insight and rigor that might not have been achievable otherwise, thus enhancing the overall quality and reliability of the study.

In addition to their analytical contributions, the presence of experts was significantly beneficial to the coordinator of the centre. Experts were instrumental in activating the tool and engaging participants, ensuring that the process ran smoothly. They provided support and guidance that facilitated a more effective and efficient implementation of the tool.

However, if expert support is not available during the process, participants suggested the provision of a detailed guide for the coordinator. This guide should comprehensively outline the steps of the process and include useful resources for communicating and explaining the process and objectives to other participants. Such a guide would ensure that the coordinator

could adequately manage the implementation of the tool, even in the absence of expert assistance. It should cover best practices for data collection, analysis, and interpretation, as well as strategies for engaging participants and maintaining their motivation and understanding throughout the process.

In conclusion, the case study highlighted several key insights regarding the perceptions and implementation of the SELFIE WBL tool among directors, the management team, teachers, learners, and trainers. Despite a general understanding of the tool's objectives by teachers and the management team, there were varying interpretations of its purpose, leading to communication challenges. Learners, in particular, exhibited confusion regarding the tool's relevance to their education and future careers. This underscored the necessity for clearer explanations and comprehensive guidance throughout the process. Additionally, participants emphasised the importance of segmenting the tool by study families or departments to capture specific educational contexts and needs. While the tool's questions were deemed understandable, a thorough grasp of its overarching objectives was crucial for meaningful responses. The tool was recognised as valuable for assessing the institution's digital integration but concerns about the optimal frequency of its deployment were raised, linking its use to the institution's broader digital strategy. The involvement of experts was highly valued for their role in data analysis and implementation support, enhancing the study's accuracy and reliability. In the absence of expert assistance, a detailed guide for coordinators was recommended to ensure effective tool deployment. Overall, understanding the SELFIE WBL tool as a fundamental component of the institution's digital plan is essential for achieving meaningful digital transformation. ■

Chapter 5.

Case study in The Netherlands

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ABSTRACT

The COVID-19 crisis accelerated digital technology adoption in education, revealing varying levels of preparedness. VET institutions, in particular, faced significant challenges. To support these institutions, the European Commission introduced SELFIE WBL, a tool to help VET institutions and companies integrate digital technology into teaching, promoting innovation and improving learner outcomes. Digital competences are essential in today's job market, and the European Commission is investing in digital skills as part of its recovery efforts.

Digitalization is crucial in vocational education. The European Commission's Joint Research Centre developed the SELFIE tool to reflect on the integration of digital technologies in educational organisations. SELFIE WBL, a new module of SELFIE as an extension for work-based learning modalities, involving VET institutions and training companies, was piloted in several EU and non-EU countries before its official launch in 2021.

The European Commission's Joint Research Centre, in collaboration with ECBO, studied SELFIE WBL in the Netherlands, where vocational education includes both school-based and work-based programs. In school-based programs, learners have significant internships, while in work-based programs, learners spend most of their time in in-company training.

The SELFIE WBL questionnaires revealed key insights into how school leaders, teachers, learners, and in-company trainers perceive the use of digital technologies in education and training. These questions are organised according to the eight SELFIE areas, understood as the digital capacity of an educational organisation: i) leadership, ii) collaboration and networking, iii) infrastructure and equipment, iv) continuing professional development, v) pedagogy: support and resources, vi) pedagogy: implementation in the classroom, vii) assessment practices and viii) student digital competence.

Based on these areas, the main findings of the current work are:

- Leadership: school leaders are moderately satisfied, showing higher satisfaction than teachers;
- Collaboration and Networking: positively perceived by school leaders and in-company trainers, but there's variability among teachers and learners, indicating a need for better collaboration;
- Infrastructure: all stakeholders are generally satisfied with technological provisions.
- Continuing Professional Development: school leaders are positive, teachers moderately satisfied, and in-company trainers dissatisfied, highlighting a need for improvement;
- Pedagogy and Assessment: school leaders, teachers, and learners view these areas positively, but in-company trainers are less satisfied, especially regarding the implementation of digital technologies;
- Learner Digital Competence: moderately to highly satisfactory among school leaders, teachers,

and learners, with in-company trainers rating themselves highly in teaching digital skills and responsible online behaviour.

These findings emphasize the need to address disparities in stakeholder perceptions and experiences to effectively integrate digital technologies in education and training.

The feedback collection for SELFIE WBL faced challenges due to the diverse respondent groups from various locations. Key observations include:

- Learners: found the language level challenging and struggled with complex questions about technology use;
- In-Company Trainers: appreciated the questionnaire's conciseness but felt some questions were too obvious. They highlighted a lack of ongoing professional development in digital technology use;
- School Leaders: recognized the questionnaire's value but were hesitant to implement it widely due to workload concerns;
- Teachers: interested in the results but felt certain sections were irrelevant or resisted digital technologies encroaching on their roles in assessment.

Based on the work delivered in this study and after analysing all the collected information, in order to enhance future initiatives, the following recommendations are proposed to improve the effectiveness and reception of the SELFIE WBL tool. Their implementation would lead to insightful feedback and better integration of digital technologies in educational settings.

1. Enhance Stakeholder Engagement: develop robust strategies for engaging stakeholders, including formal agreements, and integrating presentations into mandatory meetings;
2. Improve Response Collection Methods: use physical questionnaires alongside digital methods, with direct interaction to encourage completion;
3. Simplify Language for Accessibility: tailor language to the comprehension levels of vocational learners and non-native speakers;
4. Offer Multiple Language Options: provide questionnaires in languages like English, Arabic, Turkish, German, French, and Spanish to accommodate non-native speakers;
5. Facilitate Meaningful Reflection: design questions to provoke thoughtful reflection rather than resistance;
6. Decentralized Feedback: continue decentralized feedback collection for nuanced insights, despite its time-intensive nature;
7. Clarify Sections of Interest: address concerns about 'collaboration and networking' and 'assessment practices' by clearly articulating their objectives and relevance;
8. Country-Specific Adaptations: avoid broad questions with obvious answers in specific contexts like the Netherlands.

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1. INTRODUCTION

The COVID-19 crisis accelerated the use of digital technology in education, particularly in remote learning. However, not all education levels and sectors were equally prepared for this transition, with VET institutions facing challenges. SELFIE WBL is introduced as a tool to support vocational education and training (VET) institutions and companies in integrating digital technology into teaching, fostering self-reflection and innovation. It aims to improve learners' motivation and learning outcomes. Digital competences are crucial in today's job market, and the European Commission is investing in digital skills as part of its recovery efforts (Hippe, Brolpito & Broek, 2021).

Digitalisation of education and digital skills are becoming increasingly important in contemporary VET. To support this process, the European Commission Joint Research Centre (JRC) developed the SELFIE tool to support educational organisation to reflect about their level of use and integration of digital technologies in all their processes, involving teaching and learning processes. crucial element of work-based learning in many VET study programmes, in recent years SELFIE WBL¹⁰⁰ was developed. Several pilots were run both in EU countries like Germany, France, Poland, Hungary, and Romania, and in non-EU countries Türkiye, Serbia, Georgia, and Montenegro.

The JRC has asked ECBO to perform a case study in the Netherlands on the usage of SELFIE WBL. The vocational education in the Dutch context specifically has a dual character in which both school-based and work-based study programmes are common. In school-based VET study programmes learners spend most time

in school, but internships are a considerable part of the curriculum. In work-based study programmes, learners spend on average 4 out of 5 days per week in in-company training and 1 day at school.

2. METHODOLOGY

The case study consisted of five phases, which have resulted in this final chapter. We describe the five phases briefly and explain the different activities within these phases.

Phase 1: Preparation

We started with the preparatory phase. The first step was to identify a case to be studied. This case consists of a team within a VET institution that will be using the SELFIE WBL tool during the project. The second step was to get a better understanding of the tool by performing a literature review on SELFIE and related aspects that are important for this project. We have used the outcomes of this literature review to develop necessary documents that we use during the project: a list of key points to analyse during the case study. We have discussed these key points with the JRC before we finalised them.

Phase 2: Case study: informing phase

In phase 1, we identified the case study that will be using the SELFIE WBL tool. Since they had no prior experience with this tool, it was important to introduce the tool to the relevant stakeholders. Phase 2 consisted therefore of informing the relevant stakeholders. Prior to this, we identified these relevant stakeholders. These stakeholders have used the tool during the project. We identified four groups of relevant stakeholders:

100. [SELFIE for work-based learning - European Education Area](#)

1. School leaders, in the context of large VET institutions, these are team leaders.
2. Teachers (at school)
3. In-company trainers, who train and guide the learners within the company
4. Learners

In cooperation with the school leader, we assigned a SELFIE coordinator from the school. Together with the coordinator from the school, we identified which teachers and in-company trainers we included in the case study and informed them on the case study.

After identifying and gathering the relevant stakeholders, we introduced the SELFIE WBL tool, the goal of the tool, and instructed the relevant stakeholders and explained our role during the project.

We also helped the SELFIE coordinator with the registration of the VET institution and companies in SELFIE WBL, setting up the SELFIE WBL questionnaires and preparing the case study at the school level.

Phase 3: Implementation of SELFIE WBL

In phase 3, the stakeholders went through the steps of SELFIE WBL themselves and filled in the stakeholder-specific questionnaire. We were available on the background in case the stakeholders needed support and assistance when using the tool and filling in the questionnaire.

It is necessary to highlight that some challenges were found when collaborating with school teams and gathering responses. After some complications to find specific team meetings to present SELFIE WBL, we conducted shorter information sessions in informal meetings (with school leaders, teachers, learners and separately, in-company trainers).

Subsequently, collecting responses proved more challenging than anticipated. Initially, we shared links via email, which was unsuccessful. We then visited the sites twice, distributing scannable QR codes throughout the buildings; however, this method also fell short of our expectations. Scanning a code did not motivate respondents to actually complete the process, especially given the hourly requirements in vocational education and the limited time available, as reported by the respondents.

We finally achieved much more success when we opted to print out the questionnaires and physically place it in front of the respondents. A tangible document, consisting of just a few pages per theme where respondents could simply place a check mark, proved to be more effective. This method also facilitated dialogue and immediate feedback on the questionnaire. We visited three different locations within the institutions, thus engaging a diverse group of respondents. For the in-company trainers, it was necessary to approach them individually, which resulted in five respondents.

Phase 4: Discussing the outcomes and experience with SELFIE WBL

Phase 4 consisted of discussing the experiences and outcomes of using the tool. The feedback of results was conducted in a decentralized manner, as we collected data from three distinct locations involving various respondents. The central focus was on the usability of the tool, and its strengths and weaknesses.

Phase 5: Analysing collected data and reporting

We concluded the case study with phase 5. This phase consisted of analysing the data

and drafting the final chapter, which includes proposed SELFIE WBL user guidelines for the different user profiles.

3. LITERATURE REVIEW

There already have been several studies investigating the use of SELFIE. Costa, Castaño Muñoz, and Kampylis (2021) assess the quality of information provided by SELFIE. Using item response theory, Cronbach's alpha, Omega, and confirmatory factor analysis, the study examined item discrimination, reliability, and construct validity. The findings indicate that SELFIE offers accurate information about a school's digital capacity, supporting the tool's quality. The innovative design and psychometric analysis of SELFIE's core items offer insights for the development of self-reflection tools for school communities, advancing the field of schools' digital capacity assessment.

There might be differences in how likely schools will be to adopt SELFIE, depending on the extent to which they already make use of digital technologies in school. Castaño Muñoz, Pokropek and Weikert Garcia (2022) investigated participation trends in self-evaluation interventions focused on enhancing the use of digital technologies in schools. The research benefits from a natural experiment where two groups of schools used SELFIE. The first group was randomly selected as part of a representative sample, while the second group voluntarily chose SELFIE for diagnostic self-evaluation. Additionally, some schools in certain regions were encouraged to use SELFIE as part of broader digitalization programs. The findings reveal that schools opting for SELFIE voluntarily tend to have lower initial levels of digitalization.

Public interventions that promote SELFIE's use can boost participation but tend to attract digitally advanced schools. The study suggests that policy interventions for enhancing schools' digital capacity should consider reaching out to schools that require more support to ensure equitable access. The participation in using SELFIE therefore does seem selective.

Many schools still have a way to go with the effective integration of technology in teaching and learning practices. Kampylis and Sala (2023) examined insights for enhancing schools' digital capacity by gathering input from school leaders, teachers, and learners in fourteen European countries using the SELFIE online tool. A thematic analysis of 5,247 questionnaire responses highlights areas for improvement in digital infrastructure, the need for more teacher training in technology integration, and variations in perspectives among school leaders, teachers, and learners.

By using data, which SELFIE collects, it is also possible to use SELFIE for research purposes. Castaño Muñoz et al. (2023), involving 60,000 teachers across Europe, examined the link between learners' digital competence development, teaching methods, and teacher professional learning. They found that using digital technologies in cross-curricular projects was strongly associated with learners' digital competence acquisition. Additionally, teachers' engagement in teacher networks was closely tied to the adoption of cross-curricular projects using digital technologies. These findings highlight the importance of fostering collaboration among teachers to enhance learners' digital competence. Both within-school and across-school teacher networks can support teacher professional development and the creation of cross-curricular projects that aid early digital competence acquisition.

SELFIE WBL is a module within the SELFIE tool, allowing schools to assess their digital readiness. Broek and Buiskool (2020) performed a feasibility study to investigate whether SELFIE could be adapted to include work-based learning in VET. The feasibility study indicates that it is possible to adapt SELFIE for work-based learning in vocational education and training (VET). Given the considerable number of learners, VET institutions, and companies involved in work-based learning, SELFIE can be widely applied. Two modalities for this adaptation were identified, with the first modality (involving both VET institutions and companies) being considered more realistic and valuable. This approach aims to foster dialogue between VET institutions and companies regarding digital technology integration in education. Adjustments are proposed to add a questionnaire for companies, improve result accessibility, offer tailored support materials, and adapt terminology. The study recommends close collaboration with stakeholders and developing promotional materials to motivate companies' participation. Further exploration of the second modality is also suggested in a phased approach.

Since then, SELFIE WBL has been developed, tested, and received positive feedback in pilot programs. The tool facilitates communication between schools and companies. The pilot program for SELFIE WBL highlighted several areas for improvement. Learners found the questionnaires too long, making them challenging to complete. Additionally, there were issues with question comprehension and terminology, which varied across countries and may be related to language translations. Some learners faced internet connectivity problems while learning from home during the pandemic. In some countries, motivating participants, especially in-company trainers, to fill out the questionnaires was difficult due to

the emergency situations caused by COVID-19, leaving little time for additional activities like SELFIE. Participants also requested more materials and assistance in interpreting the results of the SELFIE report to maximize its effectiveness (Hippe, Brolpito & Broek, 2021).

As mentioned above, the questionnaire length is a challenge and can reduce response. In a recent paper Cachia, Pokropek and Giannoutsou (2023) introduced a concise version of the European Commission's SELFIE tool, designed to assess school digital capacity. They propose two shorter instruments based on SELFIE: a 16-item midi-SELFIE and an 8-item mini-SELFIE, suitable for situations with time constraints. These shorter versions maintain predictive power. They demonstrate their utility in three cases: tracking digital capacity changes in selected schools, examining regional disparities in Portugal, and exploring the relationship between digital capacity and teachers' technology use time in Spain. The results indicate that the shortened instruments can effectively serve specific purposes like monitoring school digital capacity and policy assessment, offering a reliable alternative to the complete tool.

Herrero (2023) published a recent JRC policy brief in which they conclude that the effectiveness of SELFIE WBL is closely tied to the presence of a workplace consultation culture. Participants in the study emphasized the significance of strong local relationships between training providers and companies for the successful operation of SELFIE WBL. To establish SELFIE WBL as a fundamental part of digital planning for companies and VET institutions, extensive awareness campaigns are needed, involving national and local employer organizations, trade unions, and sector skills councils. In the same policy brief, they also distinguish the following drivers and barriers for SELFIE WBL:

Drivers

1. Understanding digital capacity and development needs: SELFIE WBL helps VET institutions and companies assess their digital capacity and technology usage. This driver is most effective when senior leaders in VET institutions recognize the value of digital development and when local companies understand the benefits of being part of a system to help them with digital growth.
2. Workplace consultation: SELFIE WBL involves users' consultation, enhancing governance, strengthening partnerships, and informing decision-making.
3. Opportunities for innovation and productivity: participation in a tool developed by the European Commission like SELFIE WBL is a strong motivator for companies aware of the need for digital transformation but concerned about the associated risks and costs. SELFIE WBL helps by analysing work practices and identifying digitization opportunities, offering a cost-effective and low-risk way to begin developing a digital action plan.
4. Competitive advantage: SELFIE WBL supports the digitalization of training, promoting efficiency and competitive advantage.

Barriers

1. Low participant engagement: engagement in SELFIE WBL requires effort and commitment. Starting to become engaged with SELFIE WBL can be the starting point for digital transformation.
2. Online survey fatigue: lengthy questionnaires may lead to superficial responses, requiring clear communication about the tool's purpose.
3. Restricted Data Access: data ownership and sharing issues need to be

addressed, along with discussions on the benefits of data sharing. SELFIE WBL prioritizes confidentiality, data protection, and integrity. Data collected from consultations with VET institutions and companies is owned by those communities, which control its sharing but there is an increasing interest to compare SELFIE WBL results with similar organizations.

4. Low Capacity for composing action plans: many organizations struggle to translate SELFIE WBL results into action plans. Improving development-planning processes is essential.

Recommendations

1. Language Adaptation: involve local, regional, and national stakeholders in adapting SELFIE WBL language to specific contexts to increase interpretability.
2. Awareness Campaigns: launch awareness campaigns targeting companies to emphasize SELFIE WBL as a catalyst for change, involving employers' organizations, chambers of commerce, and the VET community.
3. Community Building: build on the existing community of practitioners and create dedicated WBL communities for awareness and information sharing, focusing on improving the capacity to interpret SELFIE WBL reports and use findings for action plans.
4. Case Studies: promote successful case studies to enhance awareness and understanding of SELFIE WBL, highlighting instances of completed cycles that led to institutional change.

4. THE CONTEXT OF VET IN THE NETHERLANDS

4.1 The structure of Upper secondary VET

The backbone of the VET system is upper secondary VET, which serves both as Initial VET (IVET) and Continuous VET (CVET). IVET/CVET programmes are offered as either school-based (BOL) or dual (BBL) track. Learners aged 16 or above can enter upper secondary VET (MBO). 41 large multi-sectoral regional training centres (ROCs) provide most publicly funded VET. Furthermore, 16 occupational colleges provide agricultural VET programmes or programmes for specific sectors. Three structural elements determine provision of MBO programmes:

- **Level:** upper secondary vocational education has four levels leading to qualifications at EQF levels 1 to 4. Learner admission to a level depends on the diploma obtained in prior education. Admission to level 1 programmes is limited to learners without prior qualification at lower secondary level. It is possible to progress within upper secondary VET; the highest level (EQF 4) gives access to higher professional education offered by universities of applied sciences. In 2022/23, 58% of VET learners were enrolled in level 4 programmes;
- **Area of study:** upper secondary VET programmes are available in four areas (sectors): green/agriculture, technology, economics, and care/welfare;

- **Learning pathway:** upper secondary VET offers two equivalent pathways: school-based (BOL) and dual (BBL). In the school-based pathway, work placements in companies make up 20%-59% of study time. In the dual pathway, learners combine work-based learning (at least 60% of study time) with school-based instruction; this often involves learning at work 4 days a week and 1 day at school.

Post-secondary VET

Specialised programmes (ISCED 453/EQF level 4) are open to graduates of MBO programmes (ISCED 353/EQF level 3, ISCED 354/EQF level 4). Their duration is 1 year.

There are slightly more males (51%) in upper secondary VET than females (49%). The differences between sectors are large. Males are overrepresented in technology education (80%); the same is true for females in healthcare/welfare (77%). In the other sectors, the male-female ratio is equal.

Participants in the school-based track are mainly the young, while almost half of the learners (47.3%) in the dual track are 23 years old or over. This is because companies also use this track to upgrade the skills of their employees.

4.2 Distinctive features

The heterogeneous and multifunctional nature of upper secondary VET in the Netherlands is unique. Key distinctive features are:

- ROCs have an average learner population of 8 357 in 2022/23, providing IVET for young people and adults and general education for adults. They are also active in CVET, with privately funded programmes. Government-regulated VET qualifications are also offered by private providers under certain conditions;

- School-based and dual pathways in upper secondary VET led to the same diplomas. Participation in each is influenced by the economic cycle; for instance, in periods of economic boom the number of learners in the dual pathway increases;
- The intended outcomes of qualifications are defined in the national qualifications system. Occupational standards cover one qualification profile or several interrelated ones. Social partners and education institutions represented in sectoral committees have a legal responsibility to develop and maintain these standards. Once approved by the education ministry, schools – in cooperation with enterprises providing work-based learning – develop curricula based on the qualification profiles;
- Education institutions have a relatively high degree of freedom to shape VET provision. The VET law only provides a broad framework outlining key elements at system level; institutions receive a lump sum for their tasks.

CVET

There is no institutional framework for continuing vocational education and training (CVET). Provision is market-driven with many suppliers. CVET comprises a range of vocational or more general courses for jobseekers, the unemployed, employees, self-employed people, and employers. There are three types of CVET:

- Upper secondary IVET programmes which are also accessible to adults;
- Training for the unemployed and jobseekers, financed by the public employment service;
- Private, non-government-funded training for employees, self-employed people, and employers.

Curriculum development and assessment

The responsibility for curriculum development and assessment is in the hands of upper secondary VET institutions. Various curricula and learning environments exist, even for programmes related to the same profession. Apart from internships taking place in a company, teacher teams have freedom to develop curricula and may include lectures, project-based learning, practical simulations, in-school mini-enterprises, and hybrid learning environments.

4.3 Challenges and opportunities

In the National Implementation Plan of the Osnabrück declaration and the council recommendation, the Dutch government describes the main challenges that the VET system in the Netherlands faces (Ministry of Education, Culture and Science, 2024). The Netherlands faces a significant long-term challenge in enhancing the quality of education. Everyone in the country deserves a good life and the opportunity to participate fully, which begins with ensuring that all children, young people, and learners have equal opportunities for learning and personal development. To address this challenge, the Netherlands aims to develop policies with the following features:

- A Strong Foundation for Every Child and Learner: the foundational skills of reading, writing, arithmetic, and citizenship are under pressure in the Netherlands. Several studies, including the OECD Programme for International Learner Assessment (PISA) 2018, indicate a decline in these skills. To counter this, Minister Wiersma has launched a master plan, and in July 2023, Minister Dijkgraaf outlined the master plan for VET in a letter to the parliament;

- **Enhancing Equal Opportunities:** a structural budget of €1 billion per year will be invested in enhancing equal opportunities, though it is important to note that this entire amount is not solely for education;
- **Investing in Quality Teachers and School Leaders:** to improve the quality of education, it is essential to invest in both the quality and number of teachers and school leaders. A structural budget of €800 million per year will be allocated for this purpose;
- **Robust Vocational Education:** the Netherlands will enhance labour-market-oriented education and training through technology-oriented senior general secondary education (Techniek-HAVO) and small-scale upper secondary vocational education (mbo). Efforts will be made to provide a broad range of upper secondary vocational courses at the regional level, minimizing the need for learners to travel far. Opportunities will be boosted by removing obstacles and encouraging progression to further education. Regional training centres (ROCs) will be strengthened to offer lifelong learning for adults and to provide classes for newcomers from day one, in line with the new Civic Integration Act. Equal treatment of learners in VET, higher professional education, and university will be promoted;
- **Ensuring Social Safety and Equal Treatment:** the Netherlands will ensure social safety and equal treatment for learners and teachers at all schools, creating a safe educational environment for all. The Inspectorate of Education will pay extra attention to social safety, investigate individual cases, and file criminal complaints if necessary. The Safety at School Act will be expanded to include teachers. Additionally, the Minister

of Education, Culture and Science intends to update the vision on internationalization in VET and higher education, with a focus on equal opportunities.

4.4 National plans and initiatives

The Netherlands promotes a culture of evidence-informed VET policy and practice and encourages innovation. Recent initiatives include providing VET institutions regularly with up-to-date regional labour market information and early school leaving data and implementing plan-do-check-act mechanisms as a basis for organisation and programme development. Research and intelligence are increasingly used to improve VET quality and effectiveness, both by involving professional researchers and by encouraging teachers to engage in research activities.

The VET sector has agreed to strengthen itself to be ready for the main current challenges like unequal opportunities for at-risk learners, an uncertain economy, and a labour market with major shortages in skilled workers. The [Work agenda VET 2023-2027](#), formally signed by the education ministry, the MBO council and other relevant stakeholders in February 2023, validated the shared policy aims for 2023-27.

There are three national priorities in the work agenda:

- Promoting equal opportunities in education and training;
- Improving the alignment between education and the labour market;
- Improving quality, research, and innovation.

Furthermore, in the [National Implementation Plan of the Netherlands](#), the goal is added that the participation rate in lifelong learning should further increase, via both formal and informal learning.

Cooperation among the partners of the Work agenda in the region is important for achieving the three priorities, which are broken down into 12 objectives within the Work agenda for VET. The schools will work together with their regional and sectoral partners to achieve the ambitious goals of the agenda. The education ministry wants to learn together what works and what does not and respond to what is happening in the Netherlands and in the world. The partners of the Work agenda for VET therefore monitor together what is being achieved with the measures.

The government is structurally investing approximately 367 million euros extra per year in ensuring quality in upper secondary VET (MBO). The budget of existing [quality agreements](#) is approximately 528 million euros per year. Both the existing budget and the extra investment will be used for the objectives in the Work agenda for MBO. In total, 0.9 billion euros per year are available for the implementation of the work agenda.

4.5 Relevant legislation for VET

The main legislation for initial VET (IVET) is:

- The Secondary Education Act (for lower secondary general and pre-vocational education);
- The Adult Education and Vocational Education Act (for upper secondary vocational education);
- The Higher Education and Scientific Research Act (for higher professional education).

The vocational track of the education system starts in lower secondary pre-vocational education with transfer possibilities to upper secondary vocational education. Upper secondary vocational education is the backbone of this track, providing labour market access.

Graduates at EQF level 4 can continue their studies in higher professional education.

4.6 Role of technology and initiatives supporting the digital transformation

There is a large new programme funded by the Dutch government, called Npuls, aimed at improving VET and higher education and the agility of education, and making better use of the opportunities of digitalization (CEDEFOP & Refernet, 2023). This should lead to several outcomes:

1. Easier access for learners (aged 16–99) to education that meets their personal needs, knowledge, and skills, both within and outside their educational institution.
2. Increased opportunities for lecturers to innovate in their teaching.
3. More efficient and effective response by education institutions to changes in the labour market.
4. Organisation of education in a way that supports teachers and does not create barriers.
5. Better access to digital learning materials for teachers and learners.
6. Learners having excellent digital skills and being well-prepared for the labour market.
7. Better alignment of tutoring with the needs of learners with learning analytics data.

This development consists of an eight-year programme in which all 113 education institutions in upper secondary vocational education (MBO, HBO and WO) and higher education (post-secondary and higher education) cooperate. They are joining forces to enable system transformation in education. The programme is led by the education ministry and is funded by the National Growth Fund. It has a budget of EUR 560 million. In the programme, four action areas are created.

Transformation hubs

A transformation hub is a community of educators, learners, researchers, employees, employers, and suppliers of digital learning material engaged in one of the programme's themes. Together they solve complex issues in education practice. The programme starts with hubs on the themes Agile and efficiently organised education, and Digital learning materials. Hubs on other themes will be set up later.

Sectoral ICT infrastructure

The sectoral ICT infrastructure serves as a road network for all ICT facilities that learners and teachers need. The infrastructure enables cooperation between all partners within the programme and beyond.

Shared knowledge infrastructure

A shared knowledge infrastructure is a way of sharing existing and new knowledge about educational innovation so that teachers really benefit from it.

Centres for teaching and learning

All education institutions are setting up a centre for teaching and learning. There, lecturers, and education teams can get advice and training on how to innovate their education. Because every education institution is different, every centre for teaching and learning has a different structure. The centres are in contact with each other.

4.7 School-based versus dual (work-based) pathway

As mentioned before, upper secondary VET in the Netherlands has two variants: school-based pathway (BOL) and dual (work-based) pathway (BBL). Learners spend most of their

time at school in the school-based pathway. In the dual pathway, learners combine working with learning. There are other differences as well. Depending on the variant, learners may be entitled to learner finance and a public transport card for free travel, or they may receive a salary (OCO, 2022).

The school-based pathway is more theoretical, involving more hours spent at school. The dual pathway is more practical, involving more hours spent working.

The school-based pathway (BOL)

Most learners in upper secondary VET follow a school-based pathway study programme. In this pathway, learners receive a lot of theory at school and sometimes complete assignments at home. Additionally, learners undertake a short internship to gain practical experience. Learners in the school-based pathway attend school five days a week and can travel for free with a public transport card. From the age of 18, they are also entitled to learner finance.

The dual pathway (BBL)

Learners aged 16 and older can follow a dual (work-based) pathway. They mainly work and attend school one or two days a week. Learners learn primarily through practical experience. Learners in a dual pathway do not receive a public transport card but usually get a travel allowance. Sometimes, they also receive compensation for the hours they spend at school.

Equal Hours, Equal Study Load

The study load for a school-based pathway study programme is a minimum of 1,600 hours per school year (Article 7.2.7, paragraph 2 of the WEB). This includes hours for homework and self-study.

Learners in the dual pathway spend part of their time at school and doing homework (850 hours

per school year) and start working immediately (at least 610 hours per school year) (Article 7.2.7, paragraph 4 of the WEB). Additionally, there are hours for guidance. Learners attend school for about two days a week and work the rest of the week. The study load is equal to that of a BOL program.

Some learners prefer learning by doing, while others want to focus on theory and work on projects with fellow learners (OCO, 2022).

5. SELECTED VET INSTITUTION FOR THE CASE STUDY

Koning Willem I College's-Hertogenbosc

Koning Willem I College is a relatively large institute for VET. It offers both school-based (BOL) and work-based (BBL) study programmes in EQF levels 1-4. Koning Willem I College is located in the northeast part of the province Noord-Brabant (North-Brabant), a province in the south of the Netherlands. About 660.000 people live in this region, two-thirds of the inhabitants also work in this region. Most jobs are in the agri-food, high-tech & data, logistics, trades, construction industries and bioscience.

Dutch vocational education is divided into four skill levels or so-called 'qualification levels,' as shown below:

1. Assistant training for a trade with simple operational tasks
2. Basic vocational training for a trade involving a range of operational tasks
3. Vocational training for the independent

professional

4. Middle management training and specialist training

Koning Willem I College runs courses at all four levels. Learners can enter and move on from courses at all levels. If they have completed qualification level 4, they can move on to a study programme in higher professional education (bachelor's degree).

In the study year 2021-2022 Koning Willem I College had 13.776 learners. Koning Willem I college has 14 locations: eight in 's-Hertogenbosch, three in Oss, 2 in Cuijk en 1 in Veghel.

6. EMPIRICAL RESULTS OF THE CASE STUDY

6.1 Response among the different stakeholders

Table 11 shows the number of respondents for each stakeholder group.

TABLE 11.

Number of respondents for each stakeholder group.

	N
School / Team leaders	2
Teachers	16
Learners	27
In-company trainers	5

Source: own elaboration.

In total, 50 respondents made use of the SELFIE WBL tool. The division among the several types of respondents is as expected, with most (27) respondents being learners, followed by the teachers (16). Five in-company trainers filled in

the questionnaire and two team leaders did the version for school- or team leaders in VET. Of the learners, 20 learners are in a school-based track (BOL) while seven are in a work-based track (BBL).

6.2 Empirical results of the SELFIE WBL questionnaires

The SELFIE questionnaire was implemented

across several respondent groups, including school leaders, teachers, learners, and in-company trainers. Each group provided ratings on various themes using a scale from 1 (low) to 5 (high). Table 12 presents the average scores for each group; we then draw insights from the data collected.

TABLE 12.

Number of respondents for each stakeholder group.

Main area	School leaders N=2	Teachers N=16	Learners N=27	In-company trainers N=5
Leadership	3.25	3.03	-	2.30
Collaboration and Networking	3.90	3.03	1.80	3.70
Infrastructure and Equipment	4.07	3.76	3.83	4.08
Continuing Professional Development	4.00	3.38	-	2.20
Pedagogy: Supports and Resources	4.00	3.45	3.80	2.47
Pedagogy: Implementation in the classroom	3.10	3.86	2.69	3.33
Assessment practices	3.20	3.14	2.33	2.67
Learner digital competence	3.75	3.50	3.08	4.30

Source: own elaboration.

Leadership

The area Leadership relates to the role of leadership in the school-wide integration of digital technologies and their effective use for the school's core work: teaching and learning.

School leaders and teachers are moderately satisfied about this area, with school leaders being slightly more positive than teachers are.

- School Leaders: The score for leadership among school leaders was 3.25, suggesting a moderate satisfaction with current leadership practices on the school-wide integration of digital technologies and their effective use for the school's core work.

- Teachers: The average score of 3.03 for teachers aligns closely with the school leaders' perception, indicating a generally consistent moderately positive view on leadership practices within the institution regarding the school-wide integration and effective usage of digital technologies.

Collaboration and Networking

The area Collaboration and Networking relates to measures that schools may consider supporting a culture of collaboration and communication for sharing experiences and learn effectively within and beyond the organisational boundaries.

School leaders and In-company trainers are positive about the extent in which digital technologies support this positive culture for collaboration, communication, and networking. Teachers view this somewhat less positive, but are still moderately satisfied

- School Leaders: This area received one of the highest scores from school leaders at 3.90, indicating a positive view on the effectiveness of digital technologies for supporting a culture of collaboration and communication for sharing of experiences and learning within and beyond the boundaries of the school.
- Teachers: Teachers scored this dimension on average significantly lower at 3.03, suggesting room for improvement in how current digital technologies are perceived among staff to facilitate and foster collaboration and communication among the teaching staff.
- In-company Trainers: With an average score of 3.70, in-company trainers are generally satisfied with how digital technology encourage and support collaboration and networking, though they view it less favourable than the school leaders.
- Learners had only a single item on this area, and were fairly negative about it, with an average score of 1.8. This item however is solely about discussion on the use of technology.

Infrastructure and Equipment

The area Infrastructure and Equipment is about having adequate, reliable, and secure infrastructure (such as equipment, software, information resources, internet connection, technical support, or physical space). This can enable and facilitate innovative teaching, learning and assessment practices.

All stakeholders are positive about infrastructure in place and the available equipment at the institution, with scores ranging from 3.76 for the teachers to 4.08 for the in-company trainers.

- School Leaders: The school leaders are highly satisfied with the current infrastructure and equipment in the school, as the average score of 4.07 indicates.
- Teachers: Teachers also reported relatively high satisfaction with the infrastructure and the equipment with an average score of 3.76, indicating they as well are positive about the institution's technological provisions.
- Learners: Learners rated this area on average at 3.83, showing a strong agreement with other groups about the adequacy of infrastructure.
- In-company Trainers: The score from in-company trainers (4.08), virtually the same as the average score for the school leaders, suggests that, from their perspective, the technological infrastructure is satisfactory as well.

Continuing Professional Development

The area Continuing Professional Development looks at whether the school facilitates and invests in the continuing professional development of its staff at all levels. Continuing Professional Development can support the development and integration of new modes of teaching and learning that harness digital technologies to achieve better learning outcomes.

The results differ for the different respondent groups: school leaders are very positive, teachers are moderately positive, but in-company trainers are negative about CPD in

relation to teaching and learning with digital technologies.¹⁰¹

- School Leaders: An average score of 4.00 indicates that school leaders are positive about the opportunities they offer for continuing professional development for teaching and learning with digital technologies.
- Teachers: With an average score of 3.38, teachers are somewhat less positive about the opportunities they have for continuing professional development to improve teaching and learning with digital technologies than school leaders. It is worthwhile to determine whether this reflects a too positive view of the school leaders or if the teachers are less aware of their CPD possibilities with respect to teaching and learning with digital technologies. Nevertheless, teachers are moderately positive about these CPD possibilities as well.
- In-company Trainers: The low score of 2.20 reflects significant dissatisfaction and highlights a critical area for improvement. For in-company trainers, opportunities to participate in CPD to better integrate digital technologies in training, and the sharing of experiences within the company about training with digital technologies are far less common than for teachers.

Pedagogy: Supports and Resources

The area Pedagogy: Supports and Resources is about the preparation of using digital technologies for learning by updating and innovating teaching and learning practices.

While teachers, learners and school leaders are mostly positive about the available supports

and resources, in contrast in-company trainers are negative about this.

- School Leaders: On average school leaders have a score of 4.00, suggesting that they are satisfied with the available supports and resources for using digital technologies for learning by updating and innovating teaching and learning practices.
- Teachers: Teachers gave this on average a lower score of 3.45, indicating a somewhat lower, but still quite positive perception of the available support and resources for pedagogical purposes.
- Learners: With an average score of 3.80, learners are relatively satisfied with the pedagogical supports and resources available to them.
- In-company Trainers: Scoring 2.47, in-company trainers are notably less satisfied, suggesting differences in perceived quality or availability of supports and resources between the school and workplace settings.

Pedagogy: Implementation in the classroom

The area Pedagogy: Implementation in the classroom relates to the implementation in the classroom of digital technologies for learning, by updating and innovating teaching and learning practices.

There are relatively significant differences between the different respondent groups: teachers are the most positive about the implementation of digital technologies in the classroom, while in-company trainers and school leaders are quite positive as well. Learners however see it differently.

- School Leaders: School leaders are moderately positive about the extent to which digital technologies are implemented in the classroom to foster learning. Their average score is 3.10

101. For obvious reasons, learners did not get question on the area of CPD.

- Teachers: With an average of 3.86, teachers are actually much more positive about the implementation of digital technologies in the classroom. Because they are working in the classroom on a daily basis, they are expected to have a better view on this.
- Learners: Learners on the other hand are much less positive about the implementation of digital technologies in the classroom, with an average score of 2.69. Interestingly there is a sizable discrepancy between the teachers and the learners.
- In-company Trainers: with an average of 3.33, the in-company trainers are fairly positive about the implementation of digital technologies in their training on the workplace.

Assessment practices

The area Assessment Practices focuses on measures that schools may consider to gradually shift the balance from traditional assessment towards a more comprehensive repertoire of practices. This repertoire could include technology-enabled assessment practices that are learner-centred, personalised and authentic.

The opinions vary on the assessment practices: school leaders and teachers are relatively positive, but in-company trainers and especially learners are negative about them.

- School Leaders: With an average of 3.20, school leaders are moderately satisfied about the assessment practices which technology enables them too nowadays.
- Teachers: Teachers score almost the same as the school leaders, with on average 3.14.
- Learners: Just like with classroom implementation, learners are far less

satisfied than teachers and school leaders about the (technology-enabled) assessment practices at school and in their company.

- In-company Trainers: Also, in-company trainers are less satisfied about the assessment practices than teachers and school leaders, with an average of only 2.67.

Learner Digital Competence

The area Learner Digital Competence is about the set of skills, knowledge and attitudes that enable the confident, creative, and critical use of digital technologies by learners.

- School Leaders: The school leaders are generally positive about the level of digital competence their learners acquire in their study programme, with an average score of 3.75.
- Teachers: The teachers are also quite positive about how the school is making learners digitally proficient, though slightly less than the school leaders: 3.50.
- Learners: Learners on average rate Learner Digital Competence a bit lower but are still moderately positive about how they learn digital skills, knowledge, and attitudes in school (3.08).
- In-company Trainers: While the in-company trainers only had a subset of two items on this area, they are very positive about the role of themselves and/or their company in teaching learners to behave safely and to find reliable and accurate information online. On average, their score is 4.30, the highest average score throughout all areas and respondent groups.

6.3 Conclusions

In conclusion, the results of the four SELFIE WBL questionnaires provide valuable insights

into the perceptions of school leaders, teachers, learners and in-company trainers regarding the integration and utilization of digital technologies in education and training settings. Distinct patterns emerge across the different thematic areas: leadership, collaboration and networking, infrastructure, continuing professional development, pedagogy, assessment practices, and learner digital competence.

Leadership within educational institutions appears to be moderately satisfactory, with school leaders showing slightly higher levels of satisfaction compared to teachers. School leaders and in-company trainers perceive collaboration and networking positively, albeit with some variation among teachers and especially learners, suggesting room for improvement in fostering a culture of collaboration and communication.

Infrastructure and equipment receive generally positive feedback from all stakeholders, indicating satisfaction with the technological provisions within educational and training environments. However, there are notable disparities in perceptions of continuing professional development, with school leaders expressing positivity, teachers showing moderate satisfaction, and in-company trainers indicating dissatisfaction, highlighting an area for improvement.

Pedagogical supports and resources, while mostly positively perceived by school leaders, teachers, and learners, receive less favourable ratings from in-company trainers, suggesting differences in perceived quality or availability between educational and workplace settings. Similarly, there are disparities in perceptions of the implementation of digital technologies in the classroom and assessment practices, with learners and in-company trainers expressing less satisfaction compared to especially

teachers and in the case of assessment practices school leaders.

Despite these variations, stakeholders generally agree on the extent to which learners' digital competence is developed in school, with school leaders, teachers, and learners expressing moderate to elevated levels of satisfaction in this area. Notably, in-company trainers rate themselves highly in their role in teaching learners' digital skills and responsible online behaviour.

Overall, these findings underscore the importance of addressing disparities in perceptions and experiences among stakeholders to ensure effective integration and utilization of digital technologies in education and training, ultimately enhancing learning outcomes and preparing learners for the digital age. Continued efforts in professional development, collaboration, and pedagogical innovation are essential to meet the evolving needs of learners in today's technologically driven world.

6.4 Experiences with SELFIE WBL

As mentioned previously, the feedback of results was conducted in a decentralized manner, as we collected data from three distinct locations involving various respondents. We began with the learners, considering the target group (predominantly EQF level 2 and 3 vocational education) and non-native speakers, who found the questionnaire particularly challenging. The language level was too high for this group, and we recommend opting for shorter, clearer, and more understandable texts for this audience.

Questions about internet access elicited many surprised (and joking) responses, as in the Netherlands, seemingly, everyone has

internet access. However, other questions about availability of technology in school were well-received, unlike the questions about how technology was used in school. These questions proved too complex for the target group and were often not understood, even after explanation. These questions include: ‘In our school, teachers give us different activities to do using technology that suit our needs’ and ‘In our company, in-company trainers use digital technologies to tailor the training to our individual needs’.¹⁰² Nevertheless, the questionnaire provided a valuable moment of reflection for the learners, making them realise that there is little to no discussion at school about the advantages and disadvantages of using technology and how to responsibly deploy it, even though this is a crucial topic for learners.

The in-company trainers were difficult to reach, as they are often onsite at companies and not frequently present at the institution. They appreciated the conciseness of the questionnaire and found the initial section on infrastructure and equipment particularly insightful. For this group, it served as a useful reflection on how well, according to the in-company trainers, the infrastructure at the companies is maintained. Some questions seemed too obvious, such as the one about using technologies for communication—after all, doesn’t everyone use email and/or WhatsApp? This created some resistance, with in-company trainers commenting that such questions made the questionnaire seem thoughtless. Nevertheless, it was a moment of reflection for

the in-company trainers, revealing that there is little to no ongoing professional development with respect to using digital technology in work-based training. Most knowledge is acquired ‘on the job’ and learned along the way. The in-company trainers proudly noted that technology better prepares learners for their future professions, providing a valuable insight.

The school leaders recognized the benefit of the questionnaire and expressed interest in deploying it across the institution. However, given the current workload on teachers and the overstretched staff, they do not see this as the right time to proceed (questioning if there will ever be a suitable moment). Nonetheless, they acknowledged that it would yield valuable information for shaping strategy and policy, providing a comprehensive institutional overview with breakdowns by sectors, levels, learning pathways, and educational teams.

Lastly, but no less important, perhaps even the most crucial, are the teachers. This group was generally positive about the questionnaire and expressed keen interest in the results from the learners and in-company trainers. Unfortunately, we were unable to gather enough responses to survey a complete group of learners associated with a specific teacher and their corresponding in-company trainer. This was the primary need expressed by the teachers. The SELFIE WBL tool provided a valuable moment of reflection for the teachers, where they particularly considered all the developments in digital technologies that have been implemented in recent years. Two sections were of less interest to the teachers, namely Assessment Practices and Collaboration and Networking. The scope of Collaboration and Networking was unclear, as digital technologies (such as e-mail) are already used to maintain contact with companies. Assessment Practices met with significant resistance; the teachers felt that digital technologies were encroaching

102. Dutch version of these questions:

- Op onze school gebruiken leerkrachten technologie om ons verschillende activiteiten te laten uitvoeren afgestemd op onze eigen specifieke behoeften.
- In ons bedrijf gebruiken bedrijfsinterne opleiders digitale technologieën om opleidingen af te stemmen op onze individuele behoeften

on their role, particularly in the assessment and qualification of learners.

6.5 Recommendations

Based on the challenges and observations encountered during the deployment of the SELFIE WBL tool, we propose the following recommendations to enhance the effectiveness and reception of future initiatives:

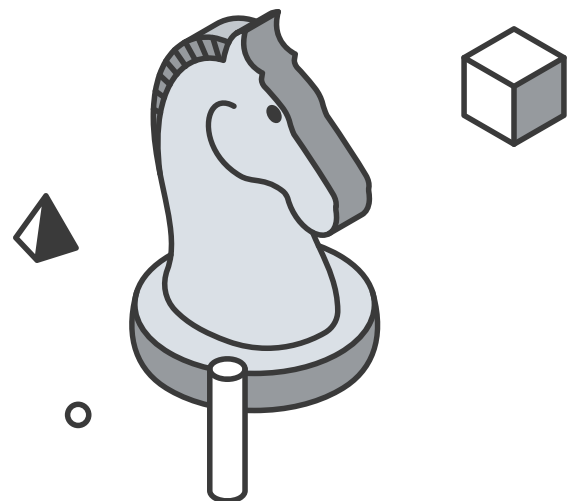
- Enhance Stakeholder Engagement:** Develop a more robust strategy for engaging stakeholders at all levels. Given our experience of last-minute removals from meeting agendas, it is advisable to secure commitment from educational teams through formal agreements where possible. Additionally, incorporating the SELFIE WBL presentation into regularly scheduled, mandatory meetings may help ensure attendance and engagement among school leaders and teachers.
- Improve Response Collection Methods:** Our experience indicates that digital methods like e-mail links and QR codes are less effective for these groups of respondents. Instead, providing physical copies of the questionnaire directly to respondents significantly increases response rates. Future surveys should continue to utilize physical questionnaires in addition to online questionnaires filled in on computers, tablets, or mobile phones; and where digital means are used, they should be accompanied by direct interaction to encourage completion.
- Simplify Language for Accessibility:** Tailor the questionnaire's language to the comprehension levels of the target groups, especially for vocational learners of EQF levels 2 and 3 and non-native speakers. Use clear, concise, and jargon-free language to ensure better understanding

and responses that are more accurate.

- Offer the questionnaire in multiple languages:** to avoid non-native learners dropping out of or not even starting the questionnaire, make sure to offer the most obvious alternative languages. In the Dutch case, these are English, Arabic, Turkish, German, French and Spanish.
- Facilitate Meaningful Reflection:** Design questions to facilitate reflection among respondents. Avoid overly simplistic or obvious questions that may lead to resistance or disengagement. Questions should provoke thoughtful reflection on current practices and the implications of technology in education.
- Decentralized Feedback for Customized Insights:** Continue the practice of decentralized feedback collection, which allows for nuanced insights from various locations and respondent types. This approach helps in tailoring strategies and policies that are more aligned with the specific needs and circumstances of each group. The approach of visiting diverse groups at multiple times and locations is more effective than pre-scheduled focus groups. While this method is not particularly challenging from a planning perspective, it is quite time intensive. Therefore, weighing the advantages and disadvantages is necessary.
- Clarify and Enhance Sections of Interest:** Address the concerns regarding the relevance and clarity of certain sections like 'collaboration and networking' and 'evaluation practices'. Redefining these sections to clearly articulate their objectives and relevance may improve engagement and the quality of responses.
- Adapt questionnaires to the intended country:** Avoid asking broad questions with obvious answers in the Netherlands,

like the availability of internet or the usage of digital communication if not stated that it means something else besides e-mail or WhatsApp.

By implementing these recommendations, the deployment of the SELFIE WBL tool can be more effectively managed to gain insightful feedback, higher response, and foster a supportive environment for integrating digital technologies in educational settings. ■



Chapter 6.

Case study in Albania

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ABSTRACT

This chapter presents a detailed case study of the Vocational Education and Training (VET) sector in Albania, highlighting the significant role of the European Union in its development. The EU has provided financial and technical assistance to align Albania's VET system with European standards, focusing on areas such as quality assurance, qualifications recognition, and digital innovation. Despite progress, challenges persist, including skills shortages and insufficient collaboration between education and industry.

The chapter emphasizes the implementation of Work-Based Learning (WBL) in Albania, particularly in the tourism sector. The 2017 VET Law and subsequent regulations have laid the foundation for WBL, defining roles and responsibilities and establishing frameworks for vocational practice in businesses. The Tourism School of Tirana's participation in piloting the SELFIE for WBL tool exemplifies efforts to integrate digital technologies in teaching and learning.

Emerging trends in Albania's VET sector include a focus on digital competences and modernizing infrastructure to enhance education quality. However, the integration of advanced technologies like AI or virtual reality remains limited.

The chapter concludes by recommending strengthening industry collaboration, aligning curricula with market needs, and leveraging digital tools to improve VET outcomes.

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1. BACKGROUND

The European Union (EU) has played a significant role in supporting the development of the Albanian Vocational Education and Training (VET) sector, aligning it with European standards, and promoting its integration with the labour market.

The EU, through its Instrument for Pre-Accession Assistance (IPA) programme, has provided financial and technical assistance to Albania to help reform and modernise its VET system. This includes support for developing the legal and policy framework, improving the quality and relevance of VET programmes, and strengthening the governance and management of the VET system (UNDP, 2020).

The EU has also supported the alignment of Albania's VET system with European standards and the Copenhagen Process on cooperation in vocational education and training, which promotes transparency, recognition of qualifications, and quality assurance in VET across the EU. Assistance has involved areas such as the development of the Albanian Qualifications Framework and the establishment of a VET accreditation system (**European Training Foundation [ETF], 2022**).

Additionally, the EU has facilitated Albania's participation in various European VET initiatives and networks, such as the European Association of Hotel and Tourism Schools (AEHT), to foster international cooperation and the exchange of best practices.

Donor financing from the EU and other international partners has been critical to supporting VET reform in Albania, particularly in improving VET infrastructure, developing occupational and qualification standards, and providing continuous professional development for VET teachers and instructors (**European Commission, 2023**).

The EU's commitment to advancing Albania's VET sector extends beyond structural reforms and financial assistance to fostering digital innovation and self-reflection tools. Initiatives such as SELFIE for Work-Based Learning (WBL) exemplify this approach, enabling VET institutions in Albania to leverage technology for improving teaching methods, enhancing collaboration with businesses, and aligning educational practices with labour market demands. SELFIE WBL is a free online self-reflection tool designed to help VET schools and companies evaluate their use of digital technologies in teaching, learning, and assessment. Students, teachers, school leaders, and in-company trainers are involved. They collectively identify strengths and weaknesses in digital practices and formulate actionable improvement plans. By fostering collaboration between schools and the workplace, SELFIE WBL supports the digital transition in VET systems, aligning educational practices with labour market needs and enhancing the quality of work-based learning environments (Hippe et al., 2021; European Commission, 2021b).

From September 2023 – March 2024, the Vocational Secondary School of Hospitality and Tourism in Tirana, with the support of the European Commission – Joint Research Centre (EC-JRC) and an independent consultant, participated in the piloting of SELFIE WBL¹⁰³ platform and contributed to its further development and improvement. In this context, with the support of a consultant, the school adopted the questionnaire, launched it, and shared it with its teachers, students and collaborating businesses. The consultant then organised the evaluation, developing instruments and a methodology to capture all the stakeholders' feedback.

103. Please see <https://education.ec.europa.eu/selfie-for-work-based-learning>

2. METHODOLOGY

To evaluate the overall experience with the SELFIE tool from the perspective of the school coordinator and the school director, data were collected via individual interviews and several aspects were taken into account: *Questionnaire 1: Overall experience with the SELFIE tool, from the perspective of the school coordinator and the school director* (Please see Appendix 1).

To evaluate the user experience (UX) of the SELFIE online questionnaire for leadership, teachers and students, data were collected via focus groups; for the UX of the SELFIE online questionnaire for mentors in business, data were collected via individual interviews as it was impossible to find a common time to be present in a joint meeting. This method was suggested by school leaders to facilitate the participation of businesses. *Questionnaire 2: User experience (UX) of the SELFIE online questionnaire from the perspective of the school leadership, teachers, students, and mentors in the business was used to facilitate the focus groups' discussions and the semi-structured interviews with businesses* (Please see Appendix 2).

3. THE CURRENT STATE OF THE ALBANIAN VET SECTOR

Albania has made considerable progress in reforming its VET system over the past decade. The country has established a comprehensive legislative framework that defines the structure and standards of the VET system, including

laws on vocational education, qualifications, and apprenticeships (UNDP, 2020; OECD n.d).

However, a skills shortage and gap in the Albanian labour market continues to exist, due to insufficient collaboration between the education and business sectors (UNDP, 2020).

Key challenges include improving the quality and attractiveness of VET, increasing work-based learning and apprenticeships, developing quality assurance mechanisms, and introducing continuous professional development for VET teachers and instructors.

Albania currently has 41 public VET providers, including 31 Vocational Secondary Schools (VSS) and 10 Vocational Training Centres (VTC), offering a range of technical and vocational programmes, particularly in information and communications technology (ICT), tourism, and construction (UNESCO-UNEVOC 2024).

While progress has been made, further efforts are needed to align the VET system with the needs of the labour market and boost the competencies of Albania's workforce.

The Albanian VET system is governed by a comprehensive legislative framework, including the Law on Vocational Education and Training (VET Law No. 8872) adopted in 2002 and the Law on the Albanian Qualifications Framework (AQF) adopted in 2010. These laws define the structure and standards of the VET system. The key actors in the governance of the VET system are:

- The Ministry of Education, Sports and Youth (MoESY), which is responsible for overall policy and strategy development
- The National Agency for Vocational Education, Training and Qualifications (NAVETQ), which is responsible for developing occupational and qualification standards, accrediting VET providers, and managing the AQF

- The National Agency for Employment and Skills (NAES), which is responsible for labour market analysis and skills forecasting

The public VET system in Albania consists of:

- 31 public VSS offering 2+1+1, 2+2 or four-year programmes
- 10 public VTC offering shorter vocational training courses

Vocational Education Secondary Schools in Albania provide long-term education up to four years (2+1+1, 2+2 or 4 in a block) of Vocational Secondary Education (VE) in levels I, II and III, which is offered for young people completing nine years of compulsory education, to be enrolled up to 17 years of age. Work-based learning or practice in business is integrated into the VET programmes, with students rotating through different companies during their studies, though this is not compulsory.

Albania is exploring the creation of multifunctional VET centres that can cater to the needs of both young people and adults, as well as the development of more flexible VET offerings, including school-based and work-based programmes.

The public VET system is primarily funded by the state budget, with additional funding from donor organisations with some revenue generation by VET providers. However, the financial autonomy of VET providers is still limited (UNDP, 2020). Overall, Albania has made progress in reforming its VET system, but challenges remain in improving the quality and relevance of VET programmes, strengthening collaboration between education and industry, and ensuring sustainable financing of the system.

3.1 WBL implementation

The foundational legislation for Work-Based Learning (WBL) in Albania is the 2017

Vocational Education and Training (VET) Law. While this law does not explicitly define WBL, it introduces key elements that support its development, such as dual VET systems, social partnerships, alignment with labour market needs, and quality assurance mechanisms (Parliament of the Republic of Albania, 2017). This law opened the way to develop more elements of WBL within the VET system's key legal framework. The law was followed by the National Strategy on Employment and Skills (NESS) 2019-2022.

Following several pilots on WBL in VET and also the development with the Osnabruck Declaration on vocational education and training and the engagement of the Government of Albania, in 2020, the Minister of Economy and Finance (MoFE) prepared Order No. 220 of 16 September 2020 on the 'Implementation of the Regulation on the Vocation Practice in the Business, in the frame of VET programmes offered in the public VET providers'. This regulation put forth a clear definition of WBL and set the framework for WBL or vocational practice implementation in business. Furthermore, this regulation touched on many elements of WBL: (a) the responsibilities of central institutions, social partners, public VET providers, and businesses engaged in the implementation of vocational practice; (b) procedures and instruments for planning and implementation of vocational practices in businesses; and (c) quality assurance elements to ensure the achievement of learning outcomes of VET qualifications during the vocational practice in businesses (Ministry of Finance and Economy, 2021).

Order No. 220 defined WBL or vocational practice implementation in business in Albania. After many years of piloting in the VET system, the institutionalisation of partnership with the private sector was one of the key achievements

of this regulation. The regulation defines the role and responsibilities of the Business Relations Coordinator (BRC) clearly. For the first time, this regulation also formally introduced the role of the instructor of vocational practice in business or with mentors. It also laid out the formats of mandatory documents such as the 'Individual contract of the vocational practice in the business,' the 'Program of the vocational practice in the business,' the 'Graphic/calendar of the vocational practice in the business,' and 'The notebook of the Vocational Practice in the business.' These documents are to be used by the VSS when sending students/trainees for practice in business. However, within the framework of the digital, green, and sustainable transition, it must be stated that all these documents are paper-based or available as individual Word or Excel documents.

Lastly, in the new National Strategy on Employment and Skills 2023-2030, a separate priority measure is dedicated to strengthening private sector involvement in VET, and focusses on WBL development

In terms of internal organisation, since 2020 the Development Units (DU) inside each of the public Vocational Education Secondary Schools in Albania are those mainly responsible for the planning and management of the WBL or practice in the business. One of the six key functions of the DU is also that of the Business Relations Coordinator.

DUs inside each public VET provider have six key responsibilities:

- 1) to connect students and employers,
- 2) to support teachers' continuous professional development (CPD),
- 3) to develop jointly with the teachers/instructors the provider-level curricula,
- 4) to assist VET learners with career guidance,
- 5) to perform public relations or awareness-raising activities for the VET provider, as well as
- 6) responsible involvement in development projects.

Within their scope and all six key responsibilities, the newly established DUs inside each public VET provider have the main duty to connect the provider and employers. They are therefore the most active mechanisms in place to closely collaborate with the private sector, but not only that. The Business Relations Coordinator (BRC) must identify, contact, and place students in businesses during their practice phase. The coordinator for teachers' CPD also must promote opportunities for teachers to be exposed to labour market developments through the WBL. The coordinator for curricula has the responsibility to develop, jointly with teachers/instructors, the provider-level curricula based on the frame curricula, but also to address the needs of regional or local private sector companies. The coordinator on career guidance will assist VET learners with information and guidance on labour market trends. The PR coordinator is tasked with organising PR or awareness-raising activities for the provider targeting everyone – including potential collaborating businesses. Finally, the coordinator of development projects is responsible for the involvement in and coordination of development projects supporting the VET provider. With the support of the development project, DUs and specifically BRCs were trained to better understand and perform their tasks.

In September 2022, a regulation related to the staff workload of VET providers (especially Vocational Secondary Schools) who cover specific functions in the DU, was approved and began implementation. The regulation stipulates that the DU staff will have reduced teaching

workload. Specifically, the BRC has a reduced workload of three teaching units less than the normal workload of 22 teaching units (classes) per week.

4. EMERGING TRENDS AND TECHNOLOGIES IN VET IN ALBANIA

Albania is making efforts to modernise and improve the quality of its VET system, including through the integration of digital competencies and other relevant soft skills into teaching and learning practices. The National Agency for Vocational Education, Training and Qualifications has revised its 'Basics of Didactics in VET' programme to incorporate digital competence and other soft skills for VET teachers and instructors.

There is a focus on enhancing the pedagogical and technical skills of VET teachers and instructors, including through the potential involvement of private sector practitioners as part-time teachers to improve the labour market relevance of VET. CPD for VET teachers and instructors is an area that is being strengthened, though national organisations providing specialised CPD are still limited.

The VET system is also moving towards more work-based learning, with efforts to make it mandatory during VET programmes and to better regulate the obligations and rights of companies that receive VET students. The aim is to strengthen the connection between VET and the labour market.

The Osnabrück Declaration on vocational education and training was adopted in 2020 by the ministers in charge of vocational education and training of the Member States, the EU Candidate Countries and the EEA countries, the European social partners, and the European Commission to enable recovery and just transitions towards digital and green economies.

The 2022 roadmap to ICT-supported modernisation of Albania's Vocational VET system highlights several key priorities. These include investment in infrastructure, training of school staff, and transforming teaching and learning methods by adopting blended learning approaches. The initiative is supported by the United Nations Development Programme (UNDP) and the Skills for Jobs (S4J) project, which aim to enhance the quality and accessibility of VET education in Albania. Additionally, the roadmap emphasises the importance of integrating digital tools to modernise educational practices, ensuring alignment with labour market needs (Skills for Jobs [S4J], 2022; UNDP, 2022).

Several platforms and curricula have been developed to support these efforts. The SMI information management system for schools in Albania facilitates better administrative processes, while the MesoVET platform provides digital teaching materials and fosters interactive learning experiences. The S4J project has been instrumental in promoting these tools. Furthermore, a digital skills curriculum for unemployed jobseekers has been introduced with support from GIZ, aiming to equip individuals with essential skills for employment. These initiatives collectively contribute to building a more inclusive and modernised VET system in Albania (S4J, 2022; Swiss contact Albania, 2021; UNDP, 2022).

In summary, the key emerging trends in the Albanian VET sector seem to be centred on improving the quality and relevance of VET through enhanced teacher training, work-based learning, and the development of more flexible and responsive VET programmes. Specific information about the use of emerging technologies like AI, virtual worlds, extended reality, or virtual reality in the Albanian VET sector is lacking. The focus of these recent initiatives is more on broader reforms and modernisation efforts rather than the integration of advanced digital technologies. The integration of innovative technologies is not explicitly mentioned in the available information (Swiss Contact 2021, ETF 2022).

5. CASE STUDY: TOURISM SCHOOL OF TIRANA

In 2024, the Vocational Education Secondary School of Hospitality and Tourism in Tirana had 690 students enrolled in two main learning directions: (1) Hospitality-Tourism and (2) Food Technology. The Hospitality-Tourism direction offers four profiles: Reception, Cooking, Services in Bars and Restaurants, and Services in Hotels and Restaurants. The Food Technology direction offers two profiles: Dough Processing, and Milk Processing. As a public vocational education provider, the Hospitality and Tourism School has effectively and successfully participated in all European-level activities, such as many European Association of Hotel and Tourism Schools (AEHT) activities (ATP, 2024).

Due also to the need for workers in the sector, the students of Hospitality-Tourism are the

ones who have the most WBL exposure and have their practice in businesses regularly two days per week. Whereas the students in the Food Technology direction mostly have their practice in well-equipped school facilities/ practice workshops. Their exposure to the real workplace is limited also due to the lack of enough businesses, the location of the factories, and the acceptance on the part of businesses to take on students/apprentices. Therefore, the school director, the SELFIE school coordinator, and the experts jointly decided to implement the SELFIE exercise with the Hospitality-Tourism students, teachers, and mentors in business. The three selected class groups were in the 12th grade, and in the three profiles of Reception, Cooking, and Services in Hotels and Restaurants. They encompass a total of 75 students, eight vocational teachers, and eight school leaders (one director, one vice director, five members of the development unit and one department head for the Hospitality-Tourism subjects) (ATP, 2024).

5.1 WBL implementation in the tourism sector – opportunities and challenges

Work-Based Learning (WBL) in Albania's tourism sector has shown significant potential but also faces distinct challenges. As a key driver of the Albanian economy, contributing over 20% of GDP when accounting for indirect effects, tourism provides an ideal platform for implementing WBL initiatives to bridge the gap between education and industry needs. According to the national frame curricula of public the Vocational Education Secondary Schools for Hospitality and Tourism, the number of practice classes in each Level and grade is:

Level I	Year I/Grade 10 – 6 Teaching Units (1 day) per week which are implemented in school workshops Year II/Grade 11 – 9 Teaching Units (1.5 days) per week which are implemented in school workshops
Level II	Year III/Grade 12 – 15 teaching Units (2 days) per week which are implemented in school workshops or in businesses
Level III?	Year IV/Grade 13 – 6 Teaching Units (1 day) per week which are implemented in school workshops in businesses

This structure now represents an opportunity for WBL exposure during the entire VE cycle, even though in the past it was perceived as a challenge to find cooperating businesses (Interview Nos. 1, 2).

Opportunities

The opportunity and strength of WBL in this sector include its ability to provide students with practical, hands-on experience in real-world settings, which is particularly valuable in hospitality and tourism, as well as a school-to-work transition tool. The hospitality and tourism VET providers in Albania have, for some years, already understood this need and/or opportunity and are sending students to partner businesses in greater numbers than what is expected in the national frame curricula (Interview Nos. 1, 2). Additionally, programs like those supported by Risi Albania have demonstrated success by fostering partnerships between vocational schools and businesses to develop niche tourism products, such as eco-tourism and cultural heritage tours. These initiatives not only enhance students' employability but also contribute to sustainable tourism development by promoting off-season activities and reducing

reliance on seasonal tourism (European Training Foundation [ETF], 2020; Risi Albania, 2024).

Furthermore, several well-established businesses in Albania's tourism sector, such as major hotels, bars and restaurants have increasingly adopted on-the-job training programmes for both new and existing employees. These training initiatives are typically led and offered by the department heads, head chefs or other highly qualified and experienced staff members (Interview Nos. 3, 4, 5). Such programmes aim to enhance employee skills in key areas such as food and beverage services, housekeeping, and customer service, which are critical for maintaining high-quality standards in the hospitality industry. The practice of on-the-job training not only improves service quality but also demonstrates a commitment to professional development, which is essential for sustaining Albania's growing tourism sector (European Training Foundation [ETF], 2020; PEM Consult, 2022).

Challenges

However, challenges persist in scaling WBL across the tourism sector. Many companies involved in WBL lack the capacity to offer comprehensive training experiences due to limited resources or expertise. Additionally, the informal nature of much of Albania's tourism industry complicates efforts to formalise partnerships between schools and businesses. Infrastructure deficiencies, such as inadequate transportation and accommodation in rural areas, further hinder the implementation of effective WBL programmes. Moreover, there is a need for better alignment between vocational curricula and industry standards to ensure that students acquire skills relevant to the evolving demands of the tourism market. Addressing these challenges requires stronger coordination amongst stakeholders, improved regulatory

frameworks, and investments in capacity building for both educators and businesses (ETF, 2020; European Commission, 2021; ERI SEE, n.d.).

Furthermore, as we are speaking about ICT usage in the hotels and the tourism sector, digitalisation or digital technologies have a limited use for learning purposes or even in the real work setting. For instance, in services and even less in the cook profile/occupation, there is a limited use of digital technologies for work, and this is also reflected in WBL implementation. The learning process in the Hotel Reception profile/occupation inside a hotel usually takes place through a training software programme that the hotels use to train new employees. However, there is no such software programme for bartenders or waiters to learn how to issue an invoice, so the student interns/apprentices learn directly from the business staff that are responsible for supervising or mentoring them (Interview No. 3).

6. FINDINGS

During the interviews or focus groups, participants were asked whether they believed the tool would affect the entire VET sector. If they answered yes, they were asked to explain why; if not, they were asked to elaborate on their reasons.

Response Rate:

- School Leaders: All 8 invited school leaders completed the questionnaire, resulting in a 100% response rate.
- Teachers: Out of 8 teachers invited, 7 responded, yielding an 88% response rate.
- Students: 65 out of the 75 students invited filled in the questionnaire, achieving an 87% response rate.
- In-company trainers (Mentors in Businesses): 17 trainers from 14 of the 39 companies invited completed the questionnaire. In some businesses, multiple responses were received:
 - 1 business had 3 respondents.
 - 1 business had 2 respondents.
 - 12 businesses had 1 respondent each.

6.1 Overall experience with the SELFIE tool for school development

To evaluate the overall experience with the SELFIE tool for school development, the data were collected from the perspective of the school coordinator and the school director, via individual interviews and several aspects were considered:

Anonymity and Confidentiality

The SELFIE school coordinator and the school director shared the opinion that anonymous feedback encourages honesty and reduces social pressure, making it easier for students, teachers, and in-company mentors to openly share their opinions and thoughts without fear of retribution, or any other possible consequences. Anonymity also allows for sharing of the aggregate results, opinions, and suggestions with the relevant stakeholders of the school to try to address the issues identified.

Customisation and Variety of Questions

The range of topics covered in the questionnaire was very comprehensive and the statements are highly explorative and detailed, digging into many issues related to the digitalisation of VET and many processes in WBL implementation. However, the tourism sector and also the

Tourism School have a limited application of ICT or digital tools in practice in both the school and the workplace.

The challenge with tailoring the questionnaire was that some mandatory statements (or topics such as digital strategy, which the school does not yet have) were not applicable. Similarly, some statements related to infrastructure (software or hardware, or even facilities) are not available, and those questions should not be posed to teachers and students.

The obligatory part of the questionnaire should be shortened and allowed to be based on the specific situation of the school, courses or programmes and its characteristics.

One positive factor is that SELFIE allows for some additional statements, but again care should be taken not to make it too long for students, teachers, or mentors to fill in, thus reducing the risk of respondent fatigue.

Support in Multiple Languages

It is very positive that such a tool is also offered entirely in the Albanian language.

Accessibility

All the students completed the questionnaire on smartphones as they did this during a class, while teachers, leaders and businesses mostly did so via computers. All of them accessed the questionnaires very easily and were able to complete them on various devices either smartphones or computers.

Ease of Sharing and Timely Delivery

The links were distributed via email to the businesses and via WhatsApp to the students and teachers. The SELFIE coordinator reported that it was quite easy to generate the links for each target group, and they are satisfied with the method of sharing the questionnaires, by

coping the links and sending them via email or on WhatsApp groups of colleagues, students, or mentors in the business.

Data Analysis Capabilities

The tool enables a clear and efficient analysis of gathered data to inform decision-making processes as the automatic report offers a quick view of the self-reflection, feedback, and opinions of all four key vocational education and WBL stakeholders. The SELFIE WBL report generated after the self-reflection process provided the school with a comprehensive analysis of its strengths and weaknesses in implementing digital technologies for work-based learning. This tailored report serves as a valuable tool for school leaders, teachers, and in-company trainers, enabling them to identify key areas for improvement in their educational practices and collaboration with industry partners. By engaging various stakeholders in the self-reflection process, the report captures diverse perspectives, fostering a holistic understanding of the school's digital readiness while also implementing WBL.

Suggestions for improvements

Some small improvements are needed in some functionalities on the platform to customise the participants or the questionnaire. As educational institution representatives, they feel that the SELFIE tool allows them to effectively gather meaningful feedback from students, teachers, and other stakeholders such as mentors in the businesses. This allows the institution to enhance self-reflective practices and promote ongoing improvements in education quality aiming at digital skills advancement. The first needed change is related to the list of mandatory topics and statements, as some are not relevant to the context or situation of a certain school or sector/occupation/workplace.

Some of the businesses who were filled out the questionnaire gave the feedback that the level of the statements does not relate to their job position/occupation either in terms of the exposure to ICT or digitalisation or in terms of their function concerning the cooperation with the school. In this respect, they suggest having one questionnaire for the department of human resources and administration of the companies and one questionnaire for the in-company mentor/instructor.

In terms of the elements in the design of the online questionnaire, there are a few elements that would be advisable to change. In the Set-up page, the option to add businesses and to remove businesses from the list is not as functional as it should be to customise the list. Once you register a company, it is impossible to remove it, which increases the number of participants and eventually shows a low participation rate.

6.2 User experience of the SELFIE online questionnaire

To assess the user experience (UX) with the SELFIE online questionnaire for the teachers, students, and mentors in business, from their own perspective and their experience as school leadership, teachers, students and businesses, the following key issues were explored:

Satisfaction

Businesses rated their satisfaction with the overall questionnaire with 8 on average. Most of them stated that depending on the field/qualification in the Kitchen, there is less applicability of ITC. Additionally, the general feedback is that the questionnaire is a bit long.

Students rated their satisfaction with the overall questionnaire with 8. In some instances,

they felt that the alternative answers to the statements were mostly intended for the general secondary school and not so much for vocational secondary schools. According to them, the statements were long and approximately 70% took quite some time to read the whole text. The statements and answers were not difficult, but the students have the tendency not to read the material and there is a risk that they will respond without reading.

Teachers and Leadership were not able to rate their satisfaction with the overall questionnaire since they judged that the school lacked the appropriate digital infrastructure and/or even a digital strategy. They stated that the questionnaire was very forward-looking, but did not fit the situation of their school, especially the statements related to processes.

Ease of use

Businesses rated the tool's ease of use with a 10. They stated that it was quite easy, and it was helpful that clarification text was included under each statement.

Students rated the tool's ease of use with a 9. They felt that for some statements which felt difficult to understand, the clarification text was helpful and necessary.

Teachers and Leadership rated the tool's ease of use with a 10. They felt it was quite easy to use and to go through the questionnaire.

Completeness

Businesses rated the completeness with 8. They stated that the questionnaire was complete in terms of digitalisation issues in general, but if we want to enter specific sub-sectors, there are some specificities in each sub-sector/qualification. Also mentioned was the fact that in some businesses or profiles/occupations like

cooking, there is no ICT infrastructure due to the reason that the strength of the tourism sector is the human factor and communication. The statements related to safety in the usage of ICT were very much appreciated by all.

Students stated that the questionnaire was very complete.

Teachers and Leadership said that the statements were general and could be more specific to the context of each field/qualification/profile.

Users' Confidence

Businesses stated that they felt quite confident in answering the statements. The clarifications under each statement made it easy. They also stated that the questionnaire made them think about how much the students benefit from digitalisation and what they could do as hosting businesses to make this possible.

Students stated (7 out of 10) that they felt confident while completing the questionnaire, due to some statements which were not applicable to their experience with WBL.

Teachers and Leadership stated that they felt noticeably confident in general, except with statements that were related to infrastructure or the digital strategy, which is lacking in their school.

Design clarity and layout

Businesses stated that everything is clear to them in terms of the statements and that the layout is very well organised and easy to follow.

Students stated that everything was clear to them, and it was very intuitive to go through the questionnaire.

Teachers and Leadership stated that the questionnaire's design and layout were very intuitive to fill out.

Font legibility

Businesses stated that the clarification texts must be a bit different from the statements so that they can be distinguished better. They suggested also that the round shape of the numbers ratings 1 to 5 could be smaller and more in proportion with the text, as they seem too big compared to the text.

Students stated that some of them confused the statements and the clarification text, and they considered them together. Therefore, it is necessary to make the statement and the clarification text more distinct visually, either by using a different font, colour or bold.

Teachers and Leadership stated that they were satisfied with the font legibility.

Colour scheme

Businesses stated that the colour scheme is suitable.

Students stated that the font must be more attractive than a black-on-white font.

Teachers and Leadership stated that the colour scheme is suitable.

Interface design

Businesses rated the interface design with 10. The rating from 1 to 5 was quite easy to understand and visually clear.

Students rated the interface design with 10.

Teachers and Leadership rated the interface design with 10.

Menu comprehensiveness

Businesses stated that the menu was easily comprehensible.

Students stated that the menu was easily comprehensible.

Teachers and Leadership stated that the menu was easily comprehensible; however, some topics on the menu could be omitted or made not obligatory if they are not applicable as they do not exist in the school (e.g. the school's digital strategy).

Loading speed

Businesses stated that the loading speed was particularly good.

Students stated that the loading speed was particularly good.

Teachers and Leadership stated that the loading speed was particularly good.

Difficulties encountered

Businesses stated that they did encounter a few difficulties in filling in the questionnaire, other than the fact that some statements were not suitable for their situation (e.g. cooks), also some abbreviations like CPD (in Alb. Zh.V.P.) or VET (in Alb. AFP) were not known to some of them.

Students stated that they did not know where to fill in their field of studies or profile when they came to the statement: In which field of study do you study?

Teachers and Leadership stated that the difficulty lies in the fact that the ICT school infrastructure does not exist and some of the obligatory statements were not relevant to their situation or they could not respond. In many instances, they chose the alternative 'Not applicable.'

Improvement suggestions

Businesses stated that it would be better and more useful if the questionnaire was more specific regarding the qualification/occupation for which they are training the students. Also, they suggested that the questionnaire could be shorter as some statements seemed repetitive.

Business representatives suggested that it would be more useful to have another questionnaire, which is more specific or customised for the tasks of the mentor, because some of the issues/topics that were asked in the questionnaire are not part of the job of the in-company mentor, but rather more of the human resources person or the administrator of the business (depending on the size of the business).

Business representatives suggested that to increase the participation of business representatives in particular, it is important to reach out to or inform them (but also other users such as students) before sending the link to the questionnaire, regarding the purpose, the benefit to all parties of being part of such a survey, and the usage of the SELFIE WBL tool.

Students stated the options of the statement 'In which field of education do you learn?' were limited (options are: Humanities and Arts; Social sciences, Business and law; Science and IT; Engineering, manufacturing and construction; Agriculture; Health and welfare; Education: Pre-school, kindergarten and similar; Services) and that they did not feel they could fill in specifically Tourism or the specific profession that they are learning.

The students suggested that the font should be different between statements and clarification texts and possibly reduce the number of statements to make it more student friendly.

Teachers and Leadership stated that statements, if possible, could be more sector/profile/qualification-specific (e.g. related to the cook or waiter occupation) and in this way, they could identify more issues, problems, and solutions.

They also stated that the formulation of the statements could be more concise and that the overall questionnaire could be shorter or done

for specific topics at times to be more user-friendly.

They suggested also that some statements needed to be omitted if the statement before was related and was answered with ‘not at all,’ or ‘never’ or similar negative responses, as it does not make sense to continue with the next statement.

To better understand the situation and to make beneficial use of the tool, they suggested that there could be a follow-up statement, ‘Why? or What is the reason?’ if the respondent chooses the alternative ‘Not applicable.’

There are some spelling mistakes in some statements and also in the Certificate when it is issued. These need to be corrected.

Recommending SELFIE

Businesses stated that they would strongly recommend the usage of the SELFIE WBL platform to all businesses involved with VET because it would provide the opportunities to identify problems with students, to enable self-reflection, and to promote improvement.

Another reason mentioned by businesses to strongly recommend the SELFIE WBL platform is also that other schools can be impacted and reminded to use such platforms to be prepared for the future. One of the business representatives stated that ‘the future is very close, but we are not prepared for it.’

The cook position/occupation does not have much application for ICT or digital tools, the bar-restaurant (waiter position/occupation) has limited application or usage of ICT, and the reception position/occupation has a significant application because the main working tool has become a Customer Relationship Manager System or software.

Students stated that they would strongly recommend the usage of the SELFIE WBL

platform especially to Vocational Education IT schools, but not only. The benefit would be that the schools would more quickly understand the gaps regarding digital tools, infrastructure or other needs and consider solutions and improvements of their work.

Teachers and Leadership stated that the tool is quite easy to use and that it is useful. They would highly recommend using it to all the other VET providers, as all self-reflection aids development. However, the topics or the questions covered must be relevant to the situation, provider, field, qualification, and/or profile/occupation setting.

6.3 Collaboration with companies about VET and WBL

Even though the experience with SELFIE WBL was a pilot one, the Tourism School of Tirana, Albania, has effectively utilised the tool to enhance collaboration with businesses in the context of WBL and VET quality enhancement. The school recognises that fostering strong partnerships with companies is a critical aspect of ensuring the success of WBL programmes. By using SELFIE WBL, the school has been able to collect valuable insights on how to improve these collaborations, which are essential for aligning educational processes and outcomes with labour market needs as well as digital transformation. One of the in-company trainers explained that, in the context of the regular practice in the workplace inside the work-based learning modality, they must assess VET learners through a paper-based form, according to the learning outcomes as established in the curricula. They suggested that it would be useful if this assessment of students could be done online, as it would be a good start for all parties to benefit from ICT usage. (Interview Nos. 1, 2).

This self-reflection process and SELFIE WBL tool usage by the school has positively impressed business representatives, as it demonstrates the school's commitment to continuous improvement and its serious approach to preparing students for professional careers. The tool has helped the school identify areas for development, such as strengthening communication channels and enhancing mutual understanding between school and industry stakeholders. This proactive engagement demonstrated to them the school's dedication to modernising vocational education and ensuring that students gain relevant skills through practical experiences (Interview Nos. 3, 4, 5).

7. OVERALL CONCLUSIONS AND RECOMMENDATIONS

- Self-reflection and self-evaluation are necessary in the development process of any kind of service; however, this process should be done without pressure as to how the results should be. There is often a misconception that evaluation or self-evaluation results can harm the image or the reputation of the school. It is mandatory to use the results to improve the work of the school. To make effective use of the results it is important to share the self-reflection results with stakeholders in the school, but also to share experience and even the results, and their usage with other education providers. The results can be

used for decision-making within the school or policymaking at the central level when several providers engage in self-reflection.

- The two key active users of SELFIE WBL – the SELFIE school coordinator and the school director – share the opinion that the tool offers a unique combination of self-reflection, feedback, and opinions of all four target groups: leadership, teachers, students, and businesses. Therefore, this is an opportunity for them to see where these groups have similar opinions or where they diverge. They recommend using the SELFIE tool continuously for their school but also for other schools as well, especially if some of the suggestions for improvements are taken up and implemented. Furthermore, the tool must serve the school's development, which is why they state that constant improvements and customisation are especially important.
- The usage of the SELFIE WBL tool aligns with Tourism School's efforts and broader initiatives to integrate technology into education and foster meaningful partnerships with businesses. Through the usage of SELFIE WBL, the school has been able to document processes and understand how to facilitate virtual learning opportunities. These advancements not only improve the quality of WBL but also highlight the school's readiness to adapt to contemporary educational demands. By actively involving businesses in this process, the school ensures that its programmes remain relevant and responsive to industry needs, further solidifying its reputation as a leader in hospitality and tourism education in Albania (ETF, 2020; European Commission, 2021).

- SELFIE WBL report provides a quick but thorough overview of the school, students, and its partner businesses' digital readiness. Therefore, insights gained from this SELFIE WBL chapter not only facilitate targeted action plans but also promote continuous professional development amongst educators, ultimately enhancing the quality of VET in the relevant school. Furthermore, the SELFIE tool, if used extensively by all VET providers, can have an impact on the improvement of the whole VET sector planning and provision. It assists in gaining a quick picture or overview of the situation, and it fosters communication with a wider community such as all or targeted teachers, students, and business representatives. In the future, it can also include the community of parents. ■



PART IV:

CONCLUSIONS

Vocational Education and Training and the digital transformation

VET is highly exposed to digital change due to its proximity to the digitalisation of the economy, especially in rapidly changing sectors. Changes in the workplace are the main drivers of digitalisation in VET, with technologies such as augmented reality (AR) and virtual reality (VR) shortening the distance between school and work. The adoption AR and VR in VET is transforming how learners are prepared for the workforce. These technologies are particularly effective because they offer immersive learning experiences that traditional methods cannot match. By simulating real-world scenarios, AR and VR allow students to practice skills in a safe and controlled environment, enhancing engagement and retention of knowledge.

When we talk about ‘shortening the distance’ between school and work, we are referring to how these technologies bridge the gap between theoretical learning and practical application. AR and VR help align educational content with actual workplace conditions, ensuring that students are well-prepared for their future roles. This linkage between training and real-world application ensures that learners acquire relevant skills that are directly applicable in their chosen careers, making the transition from education to employment much smoother.

It is also important to highlight that the digital learning taking place in VET has two distinct but overlapping aspects: using digital tools to learn and learning to use digital technologies used in industry. When designing training programs, it is fundamental to include specific jobs skills requirements from the labour market to better address current demands.

More proactive stance from policymakers

In the last decades, VET policy on digitalisation has been responsive to developments. But the quantitatively and qualitatively new challenges posed by digital technologies mean that VET policy must catch up with the curve, embracing the technology to maximise pedagogically relevant applications and preparedness for work.

At national and European policy levels, a more proactive stance is needed within VET which seeks to understand fully the challenges and opportunities raised by the digital transformation, and how to minimise the former whilst maximising the latter.

There is a clear need to make a major upgrade in support for digitalisation to make the most of the latest wave of technology. This implies making significant investments, for example, in teacher education as well as equipment and infrastructure, among other areas. Otherwise, VET will continue to fall behind. It is also important to bring together research, innovation and teaching practice, to move forward and support the further development of the VET sector.

It is imperative that we start to close the gap between the digital worlds inside and outside VET (the digital life experiences of young people and their experiences in VET) and that we also build a better understanding of how technology is impacting learning processes, especially for young people. In short, there is an increasingly sharp contrast between the comparatively constrained school digital environment and the relatively unconstrained digital world the students live in. It is expected an increasing divergence between these two worlds in the next years unless measures are taken to better aligned digital worlds outside and inside VET.

Enablers

Eight enablers for the digital transformation of the VET sector are identified, based on the literature review and its confrontation with existing policies and initiatives:

1. Career education and guidance
2. Development of information systems
3. Ecological approach and collaborations
4. Flexible accreditation mechanisms
5. Holistic development of learners' skills
6. Inclusion and sustainability
7. Pedagogical and transformative potential of digital technologies
8. Teacher training for changing roles

The consideration of these factors is crucial for the effectiveness of any policy or initiative focused on supporting the digital transformation of the VET sector, always adapted to the goals, interests, resources and context of these actions.

Emerging technologies and trends. A new wave of technology

Emerging trends are changing the digitalisation of VET. The latest technologies, such as artificial intelligence (AI) and virtual or augmented reality are changing the path of digitalisation, reflecting and mirroring what is happening in industry and offering a higher level of interactivity compared to previous technologies.

This wave is also influencing the relationship between teachers and learners, as well as the need for both teachers and trainers to update their competences. As it has been already mentioned, there is a growing gap between young people's digital experiences and their VET experiences, prompting the need for wider reflection on what and how young people will need to learn in the emerging digital world.

Teachers' attitudes and skills vary across the spectrum, and while the latest technologies offer advantages, they also raise questions about the role of teachers in a digitally connected world. The VET system must equip teachers with the skills they need, and address resistance to change, inadequate funding and infrastructure issues to keep up with the rapid pace of change in industry. Strengthening leadership and opening a discussion about the implications of digital technologies for the teachers' role should also be considered.

The results of this whole line of research also highlight the importance of soft and transversal skills for the digital and ecological transitions. Emerging technologies, such as AI, have the potential to give learners greater autonomy in learning than existing digital tools, supporting the development of these generic skills.

The benefits from this new wave of technology are in line with previous ones:

- Making learning more engaging
- Enabling more practical learning experiences
- Raising of learners' motivation
- Enhancing inclusion for learners

The challenges to implementing innovative technologies are also familiar but becoming more acute:

- Rapid pace of change and speed of technological evolution makes very complex for VET systems to keep up
- Need for investment in equipment and infrastructure
- Need for teachers and trainers' competences update
- Concerns about engagement with private EdTech providers

Emerging technologies integrated into VET plans prepare learners for the industry, ensuring they are equipped with the skills and knowledge

needed for success. To maintain a competitive edge, digital technologies and emerging technologies in VET courses could play a key role. Supporting collaboration and resource sharing through open education initiatives will further enhance the quality of VET resources and experiences. By doing so, VET policy makers can create an environment conducive to innovation, adaptability, and student success in an ever-evolving landscape. Gaining clearer knowledge to better understand how emerging trends affect VET, to develop a timely and agile set of responses, should be a policy priority.

Special attention should be placed on the capacity for these emerging technologies as a vector for inclusion of learners but, at the same time, they can also extend the digital divide between the countries, regions and VET institutions that are able to keep the pace in terms of investment, equipment and training, and those which are not.

Artificial Intelligence in VET

VET has often been 'behind the curve' of technological change, but AI is posing too many questions and challenges that a real change in this for the VET sector is needed. In sum, keeping pace with the rapid adoption of AI in the workplace is likely to be a key challenge in the coming years.

AI systems offer new possibilities for VET resources and learning experiences by promoting accessibility, engagement, and personalization. AI facilitates interaction, collaboration, and active learning through immersive experiences for both students and educators. To address concerns about AI, policy makers should prioritize the integration of AI and other emerging technologies, ensuring responsible use, data privacy, and equitable access to resources.

AI implications for VET

The implications of AI for VET are profound, particularly in the realm of **human-AI interaction**. AI technologies have the potential to redistribute agency between learners and educational systems, empowering students to take a more active role in their educational journeys. By providing personalized support and real-time feedback, AI can tailor learning experiences to individual needs, enhancing the effectiveness of training programs. Moreover, AI enables VET programs to become more flexible and responsive, adapting to the evolving demands of the workforce and ensuring that learners are equipped with relevant skills. As a result, the integration of AI in VET not only enhances educational outcomes but also prepares learners for the dynamic nature of modern work environments.

The **development of skills** in the context of VET is undergoing a significant transformation due to the potential of AI to automate various tasks. This shift necessitates a rethinking of traditional skill definitions within VET, prompting educators to emphasize competences that AI cannot easily replace, such as creativity, problem-solving, and socio-emotional skills. These human-centric skills are becoming increasingly important and should be prioritized within VET programs to ensure that learners are equipped to thrive in an AI-enhanced world. By focusing on these areas, VET can prepare students not only to work alongside AI but also to leverage its capabilities while maintaining the uniquely human attributes that drive innovation and collaboration.

The **evolution of assessment** in VET is being significantly influenced by AI and learning analytics, which facilitate continuous formative assessment. This advancement allows for a more dynamic and ongoing evaluation of

student progress, providing timely insights that can be used to tailor learning experiences. As AI becomes more integrated into the assessment process, there is a potential shift from traditional assessment methods to more authentic approaches that better reflect practical skills and workplace readiness. These AI-driven assessments can simulate real-world scenarios, offering a more accurate measure of a learner's capabilities and preparedness for the demands of the modern workforce. This shift ensures that VET programs remain relevant and effective in equipping students with the skills needed for success.

In the context of VET, the concept of the '**New Trivium**' emerges as AI reshapes foundational skills such as writing and mathematics. This transformation necessitates that VET programs adapt their curricula to equip learners with skills to use AI ethically and effectively and to effectively integrate AI tools into the training processes. By doing so, VET can ensure that learners are adequately prepared for an AI-augmented workforce, where traditional skills are enhanced and redefined through technology. Incorporating AI into the educational framework allows students to not only master essential skills but also to understand and leverage AI as a tool for innovation and efficiency in their respective fields. This adaptation is crucial for maintaining the relevance and efficacy of VET in an increasingly AI-driven world.

Artificial intelligence is seen as having great potential for personalised learning and analytics with a high level of interest from teachers. Further, these potentials mean AI could become a continuous support to learning, unlike VR, AR and 3D which are less likely to be used every day.

There is potential for AI systems to be used as a tool in curriculum development, to

offer advantages in terms of making digital educational content creation easier, releasing teachers to make more varied interactions with their students according to learners' abilities. Finally, AI has the potential to give greater agency in learning to learners than other digital technologies. It will imply supporting the development of the necessary competences and skills (including soft and transversal skills).

Ethical and legal concerns (such as algorithmic bias, fairness, transparency, data privacy and security) as well as providing support to teachers on the effective use of AI are two key challenges that need to be addressed. Indeed, the complexity of AI and its rapid pace of development means teachers will need support to develop the capabilities they will need to use it effectively in educational contexts, which may slow down its roll-out. In addition to that, the rapid diffusion of generative AI is affecting learners' habits.

VET programs must evolve to integrate AI-related technologies together with a focus on developing human-centered competences that complement AI, to better prepare learners for a rapidly changing labour market influenced by technological advancements.

AI, as other emerging technologies, has the power to change the relationship between teachers, learners, and technology; so, it is of vital importance that policy makers initiate a dialogue to reconsider the necessary roles and competences for teachers and learners, in relation to the integration of AI in VET. This may involve adapting VET institutions to better support the evolving needs of learners and teachers.

AI is a transformative technology with both advantages and challenges for VET systems. It is highly recommended for policymakers to have a more proactive approach to the integration

of AI in VET, rather than the more reactive approach in the past, which makes very difficult to VET to ride the wave.

The key conclusion emphasizes the importance of adopting a proactive approach to anticipate future needs in the field. It is crucial to discuss both the potential benefits and challenges of AI adoption. While AI presents significant opportunities, it also poses challenges for vocational education and training. Therefore, the focus should be on how VET can adapt to meet labor market demands by leveraging AI opportunities and mitigating its challenges.

Case studies. Vocational Education and Training (VET) and SELFIE for work-based learning (SELFIE WBL)

Regarding the case studies, the main conclusions for each country are detailed below.

VET and SELFIE WBL tool in Albania

Reform and Modernization of VET: Albania has made significant strides in reforming its VET system, aligning it with European standards. This includes establishing a comprehensive legislative framework and improving the quality of VET programs. However, challenges persist in terms of skills shortages and insufficient collaboration between education and business sectors.

Implementation of Work-Based Learning: WBL is integrated into the VET programs in Albania, with students rotating through different companies during their studies. Despite the progress, further efforts are needed in terms of extending and regulating WBL modalities.

Emerging Trends in VET: The Albanian VET sector is focusing on modernizing its offerings by integrating digital competences and soft skills into teaching. The sector is also moving towards more work-based learning and developing more flexible VET programs.

SELFIE WBL: The tool is appreciated by the Albanian VET actors involved in the study for its anonymity, customization, and multilingual support. It is seen as a valuable resource for self-reflection and improving education quality by identifying gaps and fostering ongoing improvements.

Challenges: While the tool is useful, there are challenges in tailoring it to specific VET institutions and sectors. Some mandatory questions are not applicable to all schools, and there is a need for customization to make it more relevant and user-friendly. Additionally, issues like limited digital infrastructure in some schools pose challenges in responding to certain aspects of the tool.

Collaboration with companies: The use of the SELFIE WBL tool has positively influenced collaboration with companies by demonstrating the school's commitment to self-reflection and improvement.

Overall, while Albania has made progress in VET reform and the implementation of tools like SELFIE WBL, there is still room for improvement in terms of collaboration, digital integration, and customization to better meet the needs of various stakeholders.

VET and SELFIE WBL tool in Austria

Digitalization in the Austrian VET System:

The Austrian dual VET system is proactive in addressing digitalization, with numerous initiatives and policies in place to ensure its relevance in the digital economy. There is continuous adaptation of training regulations

and the introduction of new apprenticeship schemes, particularly in IT sectors, to meet evolving digital demands.

Success of the Dual VET Model: The Austrian dual VET model is characterized by its combination of work-based learning and theoretical education, which is highly effective in reducing youth unemployment and ensuring high satisfaction among apprentices and training companies.

SELFIE WBL: The tool is valued by the Austrian participants in the study for identifying digital competences and strategies within the dual VET system. It supports self-reflection on the use of digital technology in learning environments and is seen as a potential asset for enhancing digital strategies.

Feedback: Stakeholders, including school representatives and in-company trainers, provided positive feedback on the SELFIE WBL tool's ease of use and comprehensive content. However, adaptations may be necessary to develop specific competences in IT curricula.

Challenges in Digital Transformation: Training companies face challenges due to digital transformation, with varying digital requirements across different sectors. There is a digital gap between high-tech and less digitally inclined professions, which affects the integration of digital learning technologies.

Impact of COVID-19: The COVID-19 pandemic accelerated the use of digital learning tools in Austrian apprenticeships, highlighting the potential for digital solutions like augmented and virtual reality to transform traditional training methods.

Future Directions: The work done suggests that Austria's dual VET system is well-positioned to handle digitalization challenges, with tools like SELFIE WBL providing valuable insights

into current digital practices and guiding future curriculum development to meet digital labor market demands.

In conclusion, the Austrian dual VET system is effectively navigating the challenges and opportunities presented by digitalization, with SELFIE WBL which could play a supportive role in this transition.

VET and SELFIE WBL tool in Spain

Digital Integration in VET: The integration of digital skills in VET is a strategic priority in the Basque Country, aimed at preparing learners for a digitally driven workforce. The emphasis is on creating an ecosystem for economic revitalization through a talent strategy that includes digital competences.

SELFIE WBL: The tool has been used to assess the integration of digital technologies within both school settings and company environments. This tool helps schools and companies adapt to the digital era by facilitating the digital transition.

Positive Impact of Expert Support: The presence of experts is seen as crucial by the VET actors involved in this study in guiding stakeholders through the implementation of digital tools like SELFIE WBL. Expert support helps in interpreting results, formulating objectives, and ensuring clear communication among participants, which is vital for successful integration.

Need for Segmentation and Customization: According to work done in the Basque Country, it is possible to say that there is a need to segment the SELFIE WBL tool according to different study programs or departments. This approach helps capture the unique realities and challenges of each academic or field of study, allowing for more targeted improvements.

Challenges in Understanding and Communication:

While the tool is understandable (according to the participants in the study), there are challenges in communicating its objectives clearly to all participants, especially learners. This highlights the need for detailed introductory sessions and comprehensive guidance materials.

Functionality and Usefulness: The SELFIE WBL tool is seen as valuable by the participants for understanding the digital reality of educational institutions. However, concerns about the optimal frequency of its deployment are linked to the institution's broader digital strategy and objectives.

Role in Digital Transformation: The SELFIE WBL tool is a fundamental pillar for designing, implementing, and executing the institution's digital plan. It is essential for achieving meaningful digital transformation within VET institutions.

Overall, the study underscores the significance of digital integration in VET, the critical role of expert support, and the need for customization and clear communication in implementing tools like SELFIE WBL to foster digital transformation in educational settings.

VET and SELFIE WBL tool in The Netherlands

Digitalization in VET: From the participants in this study, for The Netherlands case, the COVID-19 crisis accelerated the adoption of digital technologies in education, with VET institutions facing particular challenges.

SELFIE WBL: The tool was introduced to help these institutions and companies integrate digital technology into teaching and learning, promoting innovation and improving learner outcomes

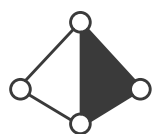
Stakeholder Perceptions: Feedback from the SELFIE WBL questionnaires revealed varying perceptions among stakeholders involved in the study. School leaders and in-company trainers were generally more positive about digital integration than teachers and learners. In-company trainers were notably dissatisfied with continuing professional development opportunities, indicating a need for improvement in this area.

Challenges and Recommendations: Challenges in using the tool included language complexity and a lack of ongoing professional development for in-company trainers. Recommendations for improvement include enhancing stakeholder engagement, simplifying language, offering multiple language options, and clarifying the relevance of certain questionnaire sections.

Role of SELFIE WBL: The tool facilitates self-reflection and helps VET institutions align their digital strategies with educational goals. It is seen by the Dutch participants as a valuable resource for identifying gaps and fostering ongoing improvements in integrating digital technologies.

Impact on Collaboration: SELFIE WBL has had a positive impact on collaboration between schools and companies, highlighting the importance of strong local relationships and stakeholder engagement for successful digital integration.

Overall, the study highlights the importance of addressing disparities in stakeholder perceptions, improving professional development, and fostering collaboration to effectively integrate digital technologies in VET settings using the SELFIE WBL tool. ■



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LIST OF ABBREVIATIONS AND DEFINITIONS

- **3D** - Three-dimensional
- **AEHT** - European Association of Hotel and Tourism Schools
- **AI** - Artificial Intelligence
- **AI4EU** - Artificial Intelligence for Europe
- **AR** - Augmented Reality
- **BBL** - Dual (work-based) pathway
- **BOL** - School-based pathway
- **BRC** - Business Relations Coordinator
- **BYOD** - Bring Your Own Device
- **CEDEFOP** - European Centre for the Development of Vocational Training
- **CENELEC** - European Committee for Electrotechnical Standardization
- **COVE** - Centres of Vocational Excellence
- **CPD** - Continuing Professional Development
- **CR** - Council Recommendation
- **CVET** - Continuing Vocational Education and Training
- **DG EMPL** - Directorate-General for Employment, Social Affairs and Inclusion
- **DESI** - Digital Economy and Society Index
- **DigComp** - Digital Competence
- **DigCompEdu** - Digital Competence Framework for Educators
- **DU** - Development Units
- **EC** - European Commission
- **ECBO** - Expertise Centre for Vocational Education
- **ECV** - European Credit system for Vocational Education and Training
- **ECVET** - European Credit system for Vocational Education and Training
- **EERA** - European Educational Research Association
- **EQF** - European Qualifications Framework
- **ERASMUS** - European Community Action Scheme for the Mobility of University Students
- **ERI SEE** - Education Reform Initiative of South Eastern Europe
- **ESCO** - European Skills, Competences, qualifications and Occupations
- **ETSI** - European Telecommunications Standards Institute
- **EU** - European Union
- **EUROPASS** - European Skills Passport
- **eTwinning** - European platform for schools
- **IBW** - Institut für Bildungsforschung der Wirtschaft
- **IAEVG** - International Association for Educational and Vocational Guidance
- **ICT** - Information and Communication Technologies
- **IMS** - Instructional Management System
- **IP** - Intellectual Property
- **ISO** - International Organization for Standardization
- **IT** - Information Technology
- **ILO** - International Labour Organisation
- **ISCED** - International Standard Classification of Education
- **IVET** - Initial Vocational Education and Training
- **JRC** - Joint Research Centre
- **KPS** - Key Performance Statistics
- **LMS** - Learning Management System
- **LTI** - Learning Technology Interoperability
- **MBO** - Middle Management Training
- **MesoVET** - Mesovet platform
- **MOOC** - Massive Open Online Course
- **NAES** - National Agency for Employment and Skills
- **NAVETQ** - National Agency for Vocational Education, Training and Qualifications
- **NESS** - National Strategy on Employment and Skills

- **NQF** - National Qualifications Framework
- **OER** - Open Educational Resources
- **ORCID** - Open Researcher and Contributor ID
- **PCT** - Personal and Career Development
- **QF-EHEA** - Qualifications Framework for the European Higher Education Area
- **QTI** - Question and Test Interoperability
- **R&D** - Research and Development
- **S4J** - Skills for Jobs
- **SCORM** - Sharable Content Object Reference Model
- **SDG** - Sustainable Development Goals
- **SELFIE** - Self-reflection on Effective Learning by Fostering the use of Innovative Educational technologies)
- **SELFIE WBL** - SELFIE for Work-Based Learning
- **SMI** - School Management Information
- **SWOT** - Strengths, Weaknesses, Opportunities, and Threats
- **TVET** - Technical and Vocational Education and Training
- **UNDP** - United Nations Development Programme
- **UNEVOC** - United Nations Educational, Scientific and Cultural Organization - International Centre for Technical and Vocational Education and Training
- **VET** - Vocational Education and Training
- **VETNET** - Vocational Education and Training Network
- **VETPRO** - Vocational Education and Training Professionals
- **VSS** - Vocational Secondary Schools
- **VTC** - Vocational Training Centres
- **WBL** - Work-Based Learning
- **WLAN** - Wireless Local Area Network
- **xAPI** - Experience API
- **XR** - Extended Reality

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Chapter 1.

Enabling the digital transformation of the Vocational Education and Training (VET) sector

Disclaimer:

The information contained in this annex is primarily derived from publicly available sources and, in certain instances, has been validated and complemented by the responsible parties of the respective initiatives. While efforts have been made to ensure accuracy, some information may be outdated or incomplete at the time of publication. The European Commission nor the authors assume no responsibility or liability for any discrepancies, omissions, or inaccuracies in the information presented herein.

Annex 1: List of initiatives analysed

ANNEX 1.1

6th Vocational Education and Training Basque Plan

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Department of Education-Vocational Education and Training- Basque Government	Basque Country, Spain
NAME OF THE INITIATIVE/POLICY	
6 th Vocational Education and Training Basque Plan	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://www.euskadi.eus/vi-plan-vasco-de-formacion-profesional/web01-a2hlanhz/es/	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
The main goal is to address a renewed vocational training model capable of adapting to a society immersed in an accelerated context of technological disruption, which poses new challenges and requires strengthening not only digital skills, but also critical and constructive thinking, creativity, and humanistic training.	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
This policy proposes a strategic plan that sets out the main orientations and areas of intervention, as well as a follow-up to the plan, including lines of action and indicators. It also includes a budget allocation.	
Axes and Areas: 1. Technology, digitalisation and intelligent systems: • Digital transformation. • Technological development and applied intelligence	

2. Strategic innovation and disruptive transformation
 - Disruptive innovation.
 - Innovation applied in strategic environments.
3. Intelligence management in training centres 5.0.
 - Applied intelligence management
 - Change management.
4. Biotechnology, regeneration and welfare.
 - Biosciences and sustainability.
 - Sustainable VET centres.
5. Human development. People as protagonists of transformation.
 - High performance training.
 - The human dimension of VET.
 - Inclusive training.
6. VET centres 5.0.
 - New model of VET centres.
7. Internationalisation of the Basque VET.
 - Internationalisation of the Basque Vocational Training System.

MAIN CHALLENGES ADDRESSED BY THE INITIATIVE

To advance towards sustainable and inclusive human development, boosting people's talent through the incorporation of advanced learning models that respond to the challenges arising from a new, more technological, digital and intelligent production environment. To consolidate Basque Vocational Training as an agent of transformation and innovation that supports people in improving their employability and Basque companies in their progress towards greater competitiveness. This must be done without ever losing sight of the fact that no one can be left behind, promoting and boosting sustainable development, in line with the Basque Country 2030 Agenda.

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

The starting point is the need for training in new skills to respond quickly and flexibly to the needs of companies and society. To this end, Basque Vocational Training proposes the importance of remaining at the forefront of technology and consolidating its immersion in intelligent environments, through 5.0 solutions that allow learners to experiment in technologically advanced environments. At the same time, VET itself must evolve its systems, spaces, and structures, taking advantage of the opportunities offered by technology and committing itself to an intelligent centre model that promotes collaborative projects and integrates multi-purpose teams, promoting innovation and human know-how as its main value, all in a digital environment.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE.
(Enablers, challenges faced, and solutions applied)

There are no public results

TARGET AUDIENCE	ADDRESSED TO
Policy makers	VET (in general)
NUMBER OF CURRENT AND POTENTIAL USERS	
Toda la ciudadanía dependiente del País Vasco	SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable)
	OTHERS

FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar).	STATUS		
100% public sector	-	2022-2024 (Annual evaluation)	Pilot/temporal		
Mixed					
100% private (including companies, NGOs., foundations, etc.)					
Please describe the funding more in depth (source, budget...)			Ongoing		
513.171.652,64 euros					
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?					
Yes, it is informed by research.	If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:				
Yes, it builds in previous experiences.					
Yes, it is informed by both.					
No.					
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.					
Technologies with the greatest impact: • 5G networks • Artificial intelligence and cognitive intelligence • Augmented reality, virtual reality, and mixed reality • Internet of Things, Internet of Everything, and Internet of Senses • Digital twin		Other technologies: • Cybersecurity • Next generation computing • Cloud and edge computing and communications • Robotisation • Data management and processing. Big Data. • Blockchain technology • 3D printing or additive manufacturing • Web 3.0			
The aim is for learners to experience technologically advanced environments to train professionals who respond to the demands of Industry 5.0. It also aims to create intelligent centres that promote collaborative projects and integrate multi-purpose spaces. These spaces should enhance people's know-how as their main value in a digital environment.					
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)					
This strategic plan includes a scorecard with 56 lines of action distributed among the different fields of intervention. For each line of action, evaluation indicators and plan validation indicators are defined (for more details, see pages 122-129).					
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT					
-					
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE					
https://www.euskadi.eus/contenidos/informacion/lh_euskal_plana/es_def/adjuntos/6PLAN_FP_cas_2022.pdf					
TAGS (initial proposal)					
Industry 5.0, Humanism, Talent centered, Technological disruption, digital and transversal skills, ecological intervention, sustainable development					

CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	
2. Digital skills for VET teachers/trainers	✓
3. Digital skills for learners	✓
4. Development of socioemotional & transversal skills	✓
5. Transformative potential of blended and online learning	
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	✓
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	✓
10. Tackling technology-related gender gaps in VET	✓
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	✓
12. Changes of the roles of practitioners/educators/counselors due to ICT	✓
13. Digital resources	

ANNEX 1.2

Resources for VET digitisation (Dualiza).

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Caixabank Dualiza	Spain
NAME OF THE INITIATIVE/POLICY	
Resources for VET digitisation-Dualiza	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://www.caixabankdualiza.es/	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
Being conscious that the path of education we are embarking on goes hand in hand with digitization, they create a repository of educational resources for the digitisation of Vocational Education and Training. The resources are aimed at teachers, companies, and learners. • For teachers: tools to facilitate distance learning and to train in Artificial Intelligence. • For learners: tools to promote opportunities and employability. • For companies: tools for register VET offers and access CVs. • For schools. Also, they offer a VET Observatory with the aim of fostering knowledge and helping the analysis of the VET system in Spain.	

DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR

RecursosFP is a website which compiles the main resources used by VET teachers from all over the world for e-learning, explaining what they offer and how they can help teachers. They also provide webinars and training on new methodologies or pedagogical innovations, trying to offer updated answers.

Observatorio de la Formación Profesional (VET Observatory) is a tool for a comprehensive understanding of Vocational Education and Training in Spain, its communities and autonomous cities.

MAIN CHALLENGES ADDRESSED BY THE INITIATIVE

RecursosFP is a response to the transition of the education sector to the digital world forced by the pandemic and the distance learning imposed by the confinement.

This transition, which should have been gradual, was forced upon many teachers, obliging them to immersion in new technologies which, in many cases, were alien to them.

In this context, CaixaBank Dualiza decided to make itself available to all of them by providing them with a portal where they could access all the tools available to them, allowing them to organise their classes, tutoring or assessment of their learners, using the means that best suited their needs.

The success of the initiative is reflected in the positioning of the website itself, which occupies the first place in Google above the pages of the administration itself.

Moreover, its continued use by the educational community contributes to extending the life of the website itself, transforming its initial limited use over time into a permanent use integrated into the CaixaBank Dualiza website.

On the other hand, the same spirit of being useful to the educational community is behind Observatorio FP. A tool that was created to bring together all the data on VET in a single portal, facilitating access that until now had been too complex due to the number of scattered portals that had to be visited to access data from different administrations.

The portal was very well received from the start, as reflected in the time spent by those who visited it, close to three minutes, which is a success in terms of the rates registered by any web portal, which shows how useful the Observatory is to those who visit it.

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

- Digital resources for VET learners: <https://www.caixabankdualiza.es/nuestra-actividad/formacion-para-alumnos-as/>
 - Digital Hackathon for VET learners: <https://www.caixabankdualiza.es/nuestra-actividad/formacion-para-alumnos-as/> and <https://www.caixabankdualiza.es/mas-de-1-200-alumnos-de-fp-participan-en-el-hackathon-retods-de-caixabank-dualiza-y-fpinnovacion/>
 - 24 hours Innovation Barcelona: <https://www.caixabankdualiza.es/nuestra-actividad/formacion-para-alumnos-as/>
- Digital resources for companies collaborating with VET: <https://www.caixabankdualiza.es/nuestra-actividad/formacion-para-empresas/>
 - Emplea FP: to register VET offers and access CVs. Developed together with FPEmpresa: <https://www.empleafp.com/site/index.html#/>
- VET Observatory: Webinars are offered for data search, processing and visualisation. They are given adhoc: <https://www.observatoriofp.com/herramientas/webinars>
- Training in Artificial Intelligence and VET:
 - Training pill (in collaboration with FPInnovación): GPT Chat for educational uses - Training Tool. <https://www.caixabankdualiza.es/chat-gpt-para-usos-educativos-training-tool/>
 - Ad-hoc course: Artificial Intelligence for VET teachers: <https://www.caixabankdualiza.es/caixabank-dualiza-lanza-su-curso-gratuito-en-inteligencia-artificial-para-un-centenar-de-profesores-de-fp/>

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

RECURSOSFP arises as a response to a need, that of teachers who are forced to digitise their entire teaching process with the confinement without having had prior training and without having the tools to do so. Faced with this leap towards digitalisation, the CaixaBank Dualiza Foundation decided to act quickly in response to these new needs. To do this, it acted in two ways: consultation of the needs of teachers through conversations with the group / web study to find out what they are looking for and what words are being most searched for. With these variables resolved, we design a portal that becomes a compilation of all the digital tools that teachers have at their disposal for distance teaching, tutoring and assessment. At the same time, a series of webinars were designed to train the community in many of the new trends. In just a month and a half (May and June 2020 – the period in which we ended the confinement) the website received 60,000 thousand visits, placing it above the pages of the administration itself and becoming a benchmark. Some webinars reach two thousand participants. Once the confinement is relaxed, the number of visits decreases, maintaining a continuous interest that leads us to make permanent – and to incorporate all the content to the corporate page – a project that was born with a temporary vocation.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

The initiative has allowed us to learn two fundamental lessons: any activity must respond to the need of your audience and do so now when that need exists.

Our main challenge is to keep this channel open with the educational community to be able to shape our activity according to their demands, and not the other way around; with training adapted to their needs, project-based learning, being aware of the tools they have, and in many cases, trying to provide them with those tools for their own achievements.

TARGET AUDIENCE		ADDRESSED TO	
Teachers and learners in VET Companies Researchers on VET in Spain		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable): metalworking and machinery production; social care; hospitality	
-		OTHERS	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	FP Empresa FPInnovación Orkestra-Instituto Vasco de Competitividad (Universidad de Deusto)	2022-2024 (Annual evaluation)	Pilot/temporal
Mixed			
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			Ongoing
-			

IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?	
Yes, it is informed by research.	If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:
Yes, it builds in previous experiences.	
Yes, it is informed by both.	
No.	
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.	
• Digital repository • Others	
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)	
-	
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT	
-	
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE	
https://www.caixabankdualiza.es/wp-content/uploads/2023/11/informe-completo-2023.pdf https://www.caixabankdualiza.es/wp-content/uploads/2023/11/estudio-publicacion-junio-2022.pdf	
TAGS (initial proposal)	
Digital repository, online training resources, digital competences, Observatory on Vocational Education and Training	
CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	✓
2. Digital skills for VET teachers/trainers	✓
3. Digital skills for learners	✓
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	✓
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	✓
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	✓
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.3

Scuola Centrale Formazione.

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Scuola Centrale Formazione	Corso del Popolo, Italy
NAME OF THE INITIATIVE/POLICY	
Scuola Centrale Formazione	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://scformazione.org/	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
SCF's Vision is to be a reference point for Professional Training in Italy. SCF is a second-level body capable of promoting innovation and development of best practices, international openness, social inclusion, development of members and educational well-being. SCF's actions aim in the three-year period 2021/23 to meet 3 strategic objectives: • Professional training of excellence • Internationalization of supply chains and training organizations • Institutional and organizational development of the institution	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
It provides a repository of training and qualification courses, information, and communication activities, as well as studies, projects, and calls for proposals related to inclusion, work, internationalisation and educational innovation. Specifically in educational innovation, it includes experiences that consider technology as a central axis.	
MAIN CHALLENGES ADDRESSED BY THE INITIATIVE	
SCF's Mission is to promote the integral development of the person through guidance and training to promote the employability and employment of young people and adults. The Central Training School plays a representative and coordinating role at national level and provides support to the activities of its partner organisations (educational and training institutions present in 12 regions operating in more than 100 locations and involving 30,826 young and adult learners) which are inspired by the doctrinal society of the Catholic Church.	
BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE	
SCF's action is developed around two areas of intervention: 1. Support to associated members Activities • Representation; • Coordination; • Services for the activities carried out by the Entities (orientation, training, and job placement).	
2. Quality and innovation of the training system Activities • Refresher and qualification courses for professionals within the Vocational Training system; • Information and communication activities; • Studies, projects, and calls for proposals.	

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)			
The Scuola Centrale Formazione came into being a few years before the major relaunch of Vocational Training, following the entry into force of law 845/78 which aimed to 'promote the personality of the worker', 'promote employment, production, and the development of the organisation of work in harmony' and 'promote scientific and technological progress'.			
LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)			
TARGET AUDIENCE		ADDRESSED TO	
Members of Scuola Centrale Formazione		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable)	
The Central Training School network is composed of 48 entities (educational and training institutions), operating in 13 Italian regions in a total of 112 localities, with a total of 30,826 learners, including adults and young people.		OTHERS	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	National networks Gio.Net; OPEN Consortium; FARI – Federazione delle Associazioni Rurali Italiane; CONFAP – Confederazione Nazionale Formazione Aggiornamento Professionale; C'Entro Associazione International networks; EfVET – European Forum of Vocational Education and Training; InnMain; CEC – Comité Européen de Coordination; AMFORHT – World Association for Hospitality and Tourism Education and Training	1975- present	Pilot/temporal
Mixed			Ongoing
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			
-			

CEC – Comité Européen de Coordination;

AMFORHT – World Association for Hospitality and Tourism IS IT INFORMED BY PREVIOUS RE-SEARCH OR PREVIOUS EXPERIENCES?

Yes, it is informed by research.	If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:
Yes, it builds in previous experiences.	
Yes, it is informed by both.	
No.	

DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable).
Please specify if the initiative/policy uses any type of emerging technology.

- Digital repository

EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)

The SCF publishes a first results report for the period 2019-2021, with the aim of making the information on its members more accessible and transparent, and to articulate it in the national landscape of vocational education and training. To consult the concrete results, please click on the following link: <https://scformazione.org/wp-content/uploads/2022/05/annuario-scf-2019-2021.pdf>. It is planned to publish a second report for the period 2021-2023, as described above.

PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT

-

PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE

<https://scformazione.org/biblioteca/>

TAGS (initial proposal)

Digital repository, online training resources, digital competences, Observatory on Vocational Education and Training

CHECKLIST FROM LITERATURE REVIEW

1. Development/use of information systems	✓
2. Digital skills for VET teachers/trainers	
3. Digital skills for learners	
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	✓
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	✓
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.4

Improve Digital Competences of VET Teachers and Trainers (IDC-VET).

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Alytus Vocational Training Centre, Lithuania (Coordinator) http://www.aprc.lt	Europe (6 countries)
NAME OF THE INITIATIVE/POLICY	
Improve Digital Competences of VET Teachers and Trainers (IDC-VET)	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://idcvet.eu/	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
The overall aim of the project is to develop a series of resources (learning scenarios) for professional development for teachers and trainers in VET for planning and delivering professional development for effective digital, open, and innovative education and pedagogies.	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
The major priority for the project is to improve the quality of VET and to modernise VET by introducing technologies for teaching and learning. The IDC-VET project offers: 1. A tool for mapping and assessing teacher digital competencies. 2. Learning scenarios 3. A digital repository of Open Educational Resources and best practice exemplars. The resources offered support teachers and trainers to enhance their skills and competences primarily in content creation and secondary in digital pedagogy by providing a comprehensive and practical guide. These scenarios will provide trainers with practical guidelines and ideas of learning approaches, activities and content when designing their own lesson plans and work-based practice.	
MAIN CHALLENGES ADDRESSED BY THE INITIATIVE	
Teachers and trainers need competence and confidence to incorporate the use of technology in both school and work-based VET. They also need new pedagogical approaches of how to use technology in practice. Traditional face to face training programmes are not sufficient in providing professional development opportunities for all VET teachers and trainers.	
BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE	
The project develops a series of resources for professional development for teachers and trainers in VET for planning and delivering professional development for effective digital, open and innovative education and pedagogies. The project offers: • An online tool for mapping and assessing teacher digital competencies to help VET them to understand their personal strengths and weaknesses, by assessing their level of digital competence development and bridge the gap between school assessment (SELFIE) and individual assessment. The tool contains sets of descriptors for 22 competences that are organised over six stages of the progression model of DIGICOMPEDU. • Tools that are focused on three key sectors in VET: metalworking and machinery production, social care, and hospitality. • New models and programmes which can support teachers and trainers in the use of technology in all sectors of VET practice, through a focus on pedagogy, assessment, and the development of digital learning materials.	

- Models and exemplars which can be transferred to a wide range of different actors and establish a community of practitioners as the basis for taking forward the project post funding.

They develop these tools and models by bringing together experienced researchers in VET in Europe with managers and practitioners from vocational schools. The European perspective is important.

The website offers 14 learning scenarios which include: Target audience, problema to solve-learning situation, overview scenario, competencies cveered from DigCompEdu, Curriculum construct(s), Scenario description, Scenario Objectives, Requirements, Outline plan, Assessment of/for learning, notes from practice, resources, and more info.

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

Process:

- Examine the needs and priorities for professional development for teachers and trainers by developing an online self-assessment tool to be used supplementary to SELFIE tool.
- Develop learning scenarios for different sectors in VET, and to test the scenarios and associated technologies within VET institutions or the workplace.
- Develop a digital repository of Open Educational Resources and best practice exemplars of using technology for teaching and training in VET in school and workplace settings.
- Develop innovative learning opportunities and provide learning materials for professional development for VET teachers and trainers.
- Develop and test different models and practices in delivering professional development for VET teachers and trainers (e.g. self-evaluation tools)
- Develop a Community of Practice in the use of technology for Open Education and training in VET in Europe.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INIATIVE YOU THINK CONTIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

A description of learning scenarios for VET teachers and trainers, related to DigCompEdu levels and to specific professional sector.

TARGET AUDIENCE	ADDRESSED TO
Teachers and trainers in three key sectors in Vocational Education and Training: metalworking and machinery production; social care; hospitality.	VET (in general)
NUMBER OF CURRENT AND POTENTIAL USERS	
Teachers and trainers in Europe (in the three key sectors).	SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable): metalworking and machinery production; social care; hospitality
	OTHERS

FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS			
100% public sector	Alytus Vocational Training Centre, Coordinator, Lithuania. Active Citizens Partnership, Greece Institute Technology and Education, Germany Learningdigital, Italy Pontydysgu, United Kingdom TecMinho, Portugal Vytautas Magnus University, Lithuania	October 2020-April 2023	Pilot/temporal			
Mixed						
100% private (including companies, NGOs., foundations, etc.)						
Please describe the funding more in depth (source, budget...)			Ongoing			
Erasmus+ Programme (KA2-Cooperation for innovation and exchange of good practices KA202-Strategic Partnerships for VET Nr. 2020-1-LT01-KA202-078040.						
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?						
Yes, it is informed by research.	If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:					
Yes, it builds in previous experiences.						
Yes, it is informed by both.						
No.						
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.						
AI, 2D-3D drawing, 3D scanner, Reverse Engineering workflow, Instagram, email, digital apps, PLE, Virtual reality, digital tools for collaborative work, digital questioning tools, platforms for programming/controlling the microcontroller and monitoring its processes, Festo FluidSIM Pneumatics simulators, CAdESIMU or equivalent, milling simulator, 3D printer, mechatronics laboratory (computers, CAD-CAM), welding robots, CNC laser cutters. Technologies are used as a basis for the design of different learning scenarios that bring learners closer to the reality of professional practice (simulations, real practices, etc.)						
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)						
14 learning scenarios (6 languages: English, German, Greek, Italian, Lithuanian and Portuguese) The evaluation process is not described						
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT						
-						
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE						
https://idcvet.eu/wp-content/uploads/2022/11/LS_01_CNC_-LD.docx.pdf https://idcvet.eu/wp-content/uploads/2022/11/LS_02_Reverse-Engineering-_-LD.docx.pdf https://idcvet.eu/wp-content/uploads/2022/11/LS_03_InstagramMarketing_Hospitality-GR-1.docx.pdf https://idcvet.eu/wp-content/uploads/2022/11/LS_04_EmailMarketing_Hospitality-GR-2.docx.pdf https://idcvet.eu/wp-content/uploads/2022/11/LS_05_Online-sales-Training-on-Hospitality-and-Tourism-TecMinho-scenario-1.docx.pdf https://idcvet.eu/wp-content/uploads/2022/11/LS_06_Hygiene-and-sanitary-control-protocols-in-catering-TecMinho-scenario-2.docx.pdf						

- https://idcvet.eu/wp-content/uploads/2022/11/LS_07_PLE-V2.docx.pdf
- https://idcvet.eu/wp-content/uploads/2022/11/LS_08_care-worker-assessment-fin.docx.pdf
- https://idcvet.eu/wp-content/uploads/2022/11/LS_09_OncologicalNursing.docx.pdf
- https://idcvet.eu/wp-content/uploads/2022/11/LS_10_Nursing-Uncertainty-in-care-action.docx.pdf
- https://idcvet.eu/wp-content/uploads/2022/11/LS_11_Technical-Drawings-in-Renewable-energy.docx.pdf
- https://idcvet.eu/wp-content/uploads/2022/11/LS_12_Read-and-understand-technical-drawings.docx.pdf
- https://idcvet.eu/wp-content/uploads/2022/11/LS_13_Understand-the-principles-of-the-functioning-and-operating-of-mechatronic-systems.docx.pdf
- https://idcvet.eu/wp-content/uploads/2022/11/LS_14_Circular-performance-in-welding.docx.pdf

Partner's project links: <https://pontydysgu.eu/projects/idc-vet/>

TAGS (initial proposal)

Self-assessment tool, teachers, and trainers' digital competencies, learning scenarios, specific digital competencies (metalworking and machinery production; social care; hospitality)

CHECKLIST FROM LITERATURE REVIEW

1. Development/use of information systems	✓
2. Digital skills for VET teachers/trainers	✓
3. Digital skills for learners	✓
4. Development of socioemotional & transversal skills	✓
5. Transformative potential of blended and online learning	✓
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	✓
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	
12. Changes of the roles of practitioners/educators/counselors due to ICT	✓
13. Digital resources	✓

ANNEX 1.5

The AI-powered Next Generation of VET .

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
University College algebra (Croatia)	Europe (11 countries)
NAME OF THE INITIATIVE/POLICY	
The AI-powered Next Generation of VET	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://www.ai4vet4ai.eu/	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO

MAIN GOAL OF THE INITIATIVE/POLICY

The main goal is to support and foster the growth of a skilled workforce in the field of artificial intelligence (AI).

With a focus on addressing the skills gap, the project aims to contribute significantly to the EU labour market's digital transformation by introducing cutting-edge teaching content and methodologies related to artificial intelligence (AI) into Vocational Education and Training (VET) curricula across 11 European countries and 18 EU NUTS2 regions.

DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR

The AI4VET4AI project takes a comprehensive approach to fostering the digital transformation of the VET sector. It begins by conducting in-depth investigations into the most impactful sectors for artificial intelligence (AI) deployment across 11 European countries and 18 EU NUTS2 regions. In collaboration with enterprises and their cluster organizations, the project develops 14 Massive Open Online Courses (MOOCs) and Teacher Training (TT) materials tailored to these sectors. Strategically aligning with research indicating substantial economic benefits from AI, project aims to not only enhance production and income but also position AI as a strategic driver of economic development. The project recognizes AI as a 'game-changing' technology, emphasizing its cross-cutting applications that can drive efficiency and productivity across diverse sectors, from agriculture and healthcare to industry and energy. This holistic approach aims to minimize resource consumption and contribute positively to achieving sustainable development goals.

MAIN CHALLENGES ADDRESSED BY THE INITIATIVE

- Lack of AI use in EU industry
- Lack of AI skills provision in VET
- Lack of AI skills in labour market
- Curriculum modernisation
- Transformation of teaching methods in VET

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

- Identifying skill gaps for higher AI adoption rate
- Raising VET awareness of AI skills for job opportunities
- Curriculum/syllabus development for AI skills in VET
- Developing project-based AI teaching content
- Learning factory for adult-learning in AI
- International AI VET campuses
- AI innovation incubators for VET learners
- 'How-to' for linking AI VET with employment and social policies

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

The project responds to the European Union's ambition to lead in innovation by focusing on the pivotal role of artificial intelligence (AI) in fostering competitiveness and addressing the challenges posed by the COVID-19 pandemic. The project, rooted in the 2020 EU Industrial Strategy, aims to bridge the gap between extensive AI research and the lack of concrete innovations and business projects. It identifies key needs, including broadening AI-related skills beyond IT professionals, integrating AI into vocational training, and addressing job susceptibility to automation. The project sets specific objectives, such as defining AI skills, building confidence in AI, deploying MOOCs for vocational education, and fostering alliances between the labour market, VET providers, and authorities.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

Started in July 2023, no lessons learnt yet.

TARGET AUDIENCE		ADDRESSED TO	
• VET learners (developing AI-related competences and skills). • VET teachers (including teaching of AI-related content in their courses and broadening the scope of their teaching) • Higher education institution (HEI) learners and teachers (forming partnerships with vocational education and training (VET) organisations for the purpose of exchanging knowledge and innovation practices) • Sectoral representatives (gaining partners who will contribute to closing AI skills gap) • Innovative startups, small and medium-sized enterprises (SMEs) and other business organisations (acquiring the much-needed talent pool of experts) • Policy makers (on regional and national level, including them in a more focused way on how Centres of Vocational Excellence (CoVE) can contribute to regional smart specialisation strategies)		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS			
It is expected than more than 1.000 VET learners will go through the programmes		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable)	
		OTHERS	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	26 partners coming from 11 different countries (Croatia, Slovenia, Serbia, Austria, Germany, Greece, Italy, Spain, Netherlands, Turkey, and Ireland) and 18 regions. See https://www.ai4vet4ai.eu/partners/ They include policy makers, VET providers, research institutions, and AI occupational sector organizations representing AI companies	Starting date: 15 th June 2023 Duration: 2023-2027	Pilot/temporal
Mixed			Ongoing
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			
Budget: €4,933,611.00, with 80% funded by the EU and the remaining 20% privately financed by each partner. EU project- ERASMUS-EDU-2022-PEX-COVE Partnership for Excellence - Centres of Vocational Excellence			

IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?	
Yes, it is informed by research.	If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:
Yes, it builds in previous experiences.	
Yes, it is informed by both.	
No.	
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.	
The project leverages various educational technologies. The two main aspects are MOOCs and AI applications. The deployment of Massive Open Online Courses (MOOCs) constitutes a significant technological aspect, providing accessible and flexible learning opportunities for vocational education and training (VET) learners, adult learners, and professionals. Application of AI in a relevant way to the 18 NUTS2 regions involved and to specific sectors are the focus of the MOOCs.	
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)	
Information N/A	
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT	
-	
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE	
-	
TAGS (initial proposal)	
AI, VET, skill gaps, VET awareness, MOOCs, VET campuses, Innovation incubators, Online learning, Adult-learning, Modernisation of curriculum, Industry 4.0.	
CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	
2. Digital skills for VET teachers/trainers	✓
3. Digital skills for learners	✓
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	✓
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	✓
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	✓
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.6

Skills OVATE.

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
CEDEFOP	Europe (32 countries)
NAME OF THE INITIATIVE/POLICY	
Skills Ovate	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://www.CEDEFOP.europa.eu/en/projects/skills-online-job-advertisements https://www.CEDEFOP.europa.eu/en/tools/skills-online-vacancies	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
Provide information on skills that employers demand from jobseekers	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
It is a system that harnesses the potential of new technologies for gathering and analysis in real time data about the skills needed by employers exploiting the information contained in EU Online Job Advertisements (OJAs). It allows doing better career and learning choices, provide better counselling and assessment of training needs, adapt curricula and training programs and detect emerging skills.	
MAIN CHALLENGES ADDRESSED BY THE INITIATIVE	
• Curriculum modernisation • Cooperation industry-VET providers • Use of Data	
BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE	
It is based in thousands of online job portals and millions of adds (including private job portals, public employment service portals, recruitment agencies, online newspapers, and corporate websites). The data is collected and analysed using innovative methods based on big data and IA analysis. Skills OVATE uses several dashboards to offer information about: Online job markets. Including: 1- information on the occupations (on ISCO 1 and 2-digit level) demanded in OJAs in the past 4 quarters.; 2- differences in demand for occupations across countries; 3- OJAs by countries and economic sectors (by NACE rev. 2. classification), and 4-customized comparisons. Skills insights. Including: 1- information on the importance of a skill group(s) in different occupations; 2- information on the importance of a skill group(s) in different sectors; 3- information on the importance of a skill group(s) in different countries; and 4- skills trends, showing how skill demand develops over time. Occupation insights. Including: 1- Information on what skills are requested in a selected occupation (or a combination of occupations); 2- types of contracts and working hours are offered by employers in different occupations; 3- information about key sectors of employment, contracts and working hours, most requested skills, and trends; and 4- how the demand for occupations changes over time Sector insights. Including: 1- information about demand for occupations across sectors and countries; 2- hat skills are requested across sectors and countries; 3- occupation and skills requested within sectors; and 4- trends on how OJAs in sectors change over time Region insights. Including: 1- difference in demand for occupations across regions; 2- which skills are in most demand in a selected region(s); OJAs in sectors across European regions; and 4- trends on how OJAs by occupation across European regions change over time.	

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)			
It was launched to offer better labour intelligence in Europe. It aims to complement other CEDEFOP's sources of labour intelligence such as Skills intelligence, European skills forecast, the European skills index, and the European skills and jobs survey.			
LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)			
New developments in big data, and Artificial intelligence are an appropriate tool for getting data from online job advertisement. This data is real-time and can be helpful to bridge curriculum and guidance to labour market needs.			
TARGET AUDIENCE		ADDRESSED TO	
• Employment services • Guidance counsellors • Training providers • Policy makers		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS			
N/A		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable): metalworking and machinery production; social care; hospitality	
		OTHERS	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	CEDEFOP EUROSTAT	Start date: April 2021	Pilot/temporal
Mixed			
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			Ongoing
CEDEFOP and EUROSTAT Budget: N/A			
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?			
Yes, it is informed by research.		If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:	
Yes, it builds in previous experiences.			
Yes, it is informed by both (data and previous experiences on skills intelligence).			
No.			
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.			
Skills OVATE uses a combination of big data and artificial Intelligence analysis systems to analyse it (namely application of text mining, natural language processing and machine learning techniques) in order to capture information about online job advertisements. It also has developed information dashboards for users to access to the data in a systemized way.			

EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)	
-	
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT	
-	
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE	
-	
TAGS (initial proposal)	
Data, modernisation of curriculum, guidance.	
CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	✓
2. Digital skills for VET teachers/trainers	
3. Digital skills for learners	
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	
8. Digital technologies in career education and guidance	✓
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.7

THEWAYUP!

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Department for Education	United Kingdom
NAME OF THE INITIATIVE/POLICY	
THEWAYUP!	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://www.thewayup.co.uk/the-way-up-game/	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO

MAIN GOAL OF THE INITIATIVE/POLICY

A fun and innovative university and career simulator that helps learners make those important life decisions. A free online game, funded by the DfE UK, helping schools empower young people to make more informed decisions about their careers and future.

An innovative new game that helps learners make better, more informed choices about their future!

Using real-world data, it gamifies important life decisions including A-levels, apprenticeships and university course choices. Based upon these decisions, the game then simulates the occupations available to players and the first five years of their graduate lives!

Funded by The Department for Education, TheWayUp! is a fun and engaging app that provides up-to-date information on the long-term consequences of education and career choices.

DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR

TheWayUp! game simulates different graduate career paths to help learners make more informed choices about their future. It also aims to help learners from disadvantaged backgrounds set aspirational educational and career goals to increase their chances of achieving them. Using real-world data, it gamifies important life decisions, including qualification levels, apprenticeships and university course choices. Based on these decisions, the game then simulates the occupations available to players and the first five years of their graduate lives. It uses data from 14 career and educational datasets.

MAIN CHALLENGES ADDRESSED BY THE INITIATIVE

Up-to-date salary and occupation information from 10 different datasets. Players decide what is important to them: earnings, happiness, work-life balance or education across 10 years of their life.

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

It is a gamification tool in which learners explore professions and make decisions about qualification levels, apprenticeships and/or university courses.

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

Needs:

- Improve career information.
- Aid transition from school education to career selection.

The game has several functionalities:

- Information of industries, sectors, jobs and related skills.
- Labour market information.
- Information on education and course choices.
- Occupational information.

The tool is appropriate both for autonomous and group use and for schools and teachers.

It counts with an in-guide mentor to explain how to use it.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

TARGET AUDIENCE	ADDRESSED TO
Youth exploring/transitioning to the labour market, anyone wanting to explore potential careers	VET (in general)
NUMBER OF CURRENT AND POTENTIAL USERS	
	SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable)
	OTHERS (Youth exploring/transitioning to the labour market)

FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS				
100% public sector		19 diciembre 2018	Pilot/temporal				
Mixed							
100% private (including companies, NGOs., foundations, etc.)							
Please describe the funding more in depth (source, budget...)			Ongoing				
Department for Education. Open Data Grant competition in the U.K. DfE Budget: N/A							
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?							
Yes, it is informed by research.	If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:						
Yes, it builds in previous experiences.							
Yes, it is informed by both (data and previous experiences on skills intelligence).							
No.							
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.							
Gamification and Longitudinal Education Outcomes (LEO) dataset.							
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)							
-							
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT							
-							
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE							
https://www.thewayup.co.uk/?fbclid=IwAR1yEBXykprbeAxljl_E3f7SayZIN4VMBWco9LB_ixBcG3Upt4pRXfwu-eE https://www.facebook.com/thewayupgame/photos/?tab=album&album_id=522891571556429&paipv=0&eav=AfYcP50jANrYS0lsMrUtdzXECgWZ_ZtJkpWFSrmgE0Ed7jL-64_Mej5wCKhq8M2Xvyo&_rdr							
TAGS (initial proposal)							
Career guidance, LMI, career counselling							
CHECKLIST FROM LITERATURE REVIEW							
1. Development/use of information systems	✓						
2. Digital skills for VET teachers/trainers							
3. Digital skills for learners							
4. Development of socioemotional & transversal skills							
5. Transformative potential of blended and online learning							
6. Flexible accreditation mechanisms							

7. Incorporation of emerging technologies (related to industry 4.0)	
8. Digital technologies in career education and guidance	✓
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.8

2022-24 Strategic Plan for Vocational Education and Training, Lifelong Learning, and Youth.

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Ministry of Education and Religious Affairs General Secretariat for VET, Lifelong Learning and Youth National Organisation for Certification of Qualifications and Vocational Guidance (EOPPEP)	Greece
NAME OF THE INITIATIVE/POLICY	
2022-24 Strategic Plan for Vocational Education and Training, lifelong learning, and youth (4th and 5th Objectives)	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://www.CEDEFOP.europa.eu/en/tools/timeline-vet-policies-europe/search/44220	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
The action aims at improving the quality of practical training (taking place in laboratories) through the improvement of the infrastructure of laboratory centres and school laboratories and the supply of appropriate equipment. It includes the renewal and complete modernisation, according to the current technological standards, of equipment in 117 laboratory centres serving vocational training institutes (IEK), vocational upper secondary schools (EPAL), post-secondary year apprenticeship classes, and vocational training schools (VTS). The specific objectives are: • to modernise VET and certification procedures; • to provide access to state-of-the-art equipment and technology; • to improve citizen services; • to facilitate digital transition; • to improve the quality of VET provision; The timeframe for all measures included in this policy development is the end of 2025.	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
Development of a digital platform for VET The digital platform for VET is expected gradually to become the core and central tool to support VET-related (administrative and learning) functions of institutions and end users.	

MAIN CHALLENGES ADDRESSED BY THE INITIATIVE

The devalued laboratory infrastructure in Greece, with its low rate of digital skills and technology development for vocational education and training (VET), are important reasons for its reduced attractiveness and its questionable effectiveness.

In response, one of the main strategic objectives of the Greek Strategic plan for vocational education, training, lifelong learning, and youth is the digital transformation of VET and lifelong learning (LLL); this includes a large number of actions and projects related to the acquisition of digital skills, improvement of digital learning and of digital governance and management. The projects are funded by EU funds and instruments, through the Recovery and resilience facility (RRF) and the Partnership agreement for the development framework 2021-27.

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

The digital platform for VET is expected gradually to become the core and central tool to support VET-related (administrative and learning) functions of institutions and end users.

The VET platform consists of two main subsystems:

1. *The VET governance subsystem*

This sub-system is planned to serve as a communication/information point (a web hub) of access to specific fields, such as the Central council of VET (KSEEEK), the Councils linking VET with the labour market (SSPAE), and the Central Scientific Committee (KEE).

2. *The distance education subsystem*

The existing training material is planned to be uploaded in this platform. It is also planned to upload future modularised digitalised study programmes to be used for distance learning purposes by young people not in education, employment, or training (NEETs), adults, and trainers for teachers and trainers; a specific 'train-the-trainer' programme is already developed. However, this e-learning approach needs to be thoroughly prepared as Greece does not have a sufficient number of e-learning trainers that are specifically trained and certified for the purpose. A specific training programme is being designed to ensure that adult educators are pedagogically sufficient for e-learning provision (noting that non-formal VET trainers, especially, are subject to certain legal requirements and need to be certified by the National Organisation for the Certification of Qualifications and Vocational Guidance, EOPPEP).

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

TARGET AUDIENCE		ADDRESSED TO	
Learners - Learners in upper secondary, including apprentices - Adult learners - Low-skilled/qualified persons Education professionals - Teachers - Trainers - School leaders - Adult educators - Guidance practitioners Entities providing VET - VET providers (all kinds) Other stakeholders - National, regional and local authorities		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS			
N/A			
		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable)	
		OTHERS (Youth exploring/transitioning to the labour market)	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector			Pilot/temporal
Mixed			
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			Ongoing
Ministry of Education and Religious Affairs General Secretariat for VET, Lifelong Learning and Youth National Organisation for Certification of Qualifications and Vocational Guidance (EOPPEP). Part of the Next generation EU Resilience and recovery facility (RRF) plan. Budget: EUR 6.9 million			

IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?	
Yes, it is informed by research.	If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:
Yes, it builds in previous experiences.	
Yes, it is informed by both (data and previous experiences on skills intelligence).	
No.	
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.	
The digitalisation of the organisation is related to: - the development of IT systems to support the administrative operations of the Organisation as well as to improve the services to citizens (electronic examination system, management system of accredited educational institutions, registries (e.g. for guidance counsellors, non-formal VET trainers, of those successful in IEK exams participants, or other certificates issues by EOPPEP, management system); - the development of a user-friendly, integrated IT tool to support the management, the transparency of the procedures and the dissemination of the developed and certified occupational profiles which are linked with framework curricula; - the digitalisation of the certification process for vocational training graduates (EQF levels 3 - 5); - the development of a pool of examination topics/questions.	
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)	
Pending for contact	
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT	
Pending for contact	
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE	
https://www.eoppep.gr/images/22PROC011916508_2022-OJS250-730619_el.pdf https://www.CEDEFOP.europa.eu/en/tools/timeline-vet-policies-europe/search/42364 https://www.CEDEFOP.europa.eu/en/tools/timeline-vet-policies-europe/search/42243 https://www.CEDEFOP.europa.eu/en/tools/timeline-vet-policies-europe/search/42364 https://www.CEDEFOP.europa.eu/en/tools/timeline-vet-policies-europe/search/44220	
TAGS (initial proposal)	
Skills intelligence systems, digital infrastructures of VET provision	
CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	✓
2. Digital skills for VET teachers/trainers	
3. Digital skills for learners	
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	✓
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	✓
8. Digital technologies in career education and guidance	✓
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	

11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	✓
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.9

Pathfinder service (Innove Rajaleidja).

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Foundation Innove, Agency for Lifelong Guidance	Regional/Estonia
NAME OF THE INITIATIVE/POLICY	
Pathfinder Service Estonia	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://rajaleida.innove.ee	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
Offer free study counselling for adults who support children in their education: parents, teachers, support specialists, etc.	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
Pathfinder is used by the national government as a key means of achieving its long-term goals and plays a pivotal role in the national lifelong guidance system. The practice is well-aligned with national and EU policy guidelines, contributing to reforming and improving the national guidance system of Estonia. Pathfinder serves as a unique LMI resource, integrated and utilised in the context of the practice. Via its simple, user-friendly and creative interface, users and professionals can access the LMI openly available across its four main sections, which are dedicated to: • youth; • adults; • the Pathfinder game; • practitioners, teachers, career coordinators. The portal also offers users the opportunity to search for, identify, contact and/or schedule an appointment with a Pathfinder practitioner close to them to receive further support.	
MAIN CHALLENGES ADDRESSED BY THE INITIATIVE	
1. career management skills 2. access to lifelong guidance services 3. assuring the quality of lifelong guidance provision 4. assessing the effectiveness of lifelong guidance provision 5. strategic leadership 6. improving careers information 7. guidance training and qualifications 8. practitioners 9. funding lifelong guidance services 10. ICT in lifelong guidance 11. raising the skills and qualifications of young people 12. raising the skills and qualifications of adults 13. improving employability and supporting older workers 14. supporting people at risk and disadvantaged groups	

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE	
• Real-time LMI • Personalised education advice • Blended counselling • Occupation information	
RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)	
LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)	
Success factors • reliable and up-to-date LMI delivered for free, addressing the diverse needs of its target groups • focus on developing content management systems • regional yet centrally-coordinated approach combination of face-to-face and digital career guidance and information services • emphasis on ensuring the qualifications of Pathfinder practitioners and on continuously enhancing their knowledge and skills • trustworthy brand in the national lifelong guidance system • collaboration among guidance stakeholders at regional and national level international cooperation Points of attention • scattered and complex LMI • lack of awareness of the Pathfinder services • limited national financial resources	
TARGET AUDIENCE	ADDRESSED TO
Learners in secondary schools; learners in vocational education institutions; young adults; early school leavers; practitioners; teachers and career coordinators. NOTE: parents; teachers and career coordinators; public authorities and institutions; businesses. Parents, teachers, career coordinators are key target groups, cooperating with practitioners; public authorities, institutions are the LMI principal sources. Companies, professional associations, individual professionals contribute to LMI production.	VET (in general)
NUMBER OF CURRENT AND POTENTIAL USERS	
230 professionals are involved in delivering the service. Pathfinder practitioners are qualified with at least a bachelor degree in a relevant field and their qualifications have to comply with the respective occupational qualification standards. They are further trained through continuing training activities, aiming at safeguarding the quality of their services.	SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable) OTHERS (Youth exploring/transitioning to the labour market)

FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector		Start date: April 2021	Pilot/temporal
Mixed			
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			Ongoing
Part funded by the EU and the Estonian government: EUR 30 348 were allocated to technical development of the portal between 2012 and 2016, plus EUR 4 200 for annual technical maintenance. Other cost categories include personnel, content development, etc.			
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?			
Yes, it is informed by research.		If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:	
Yes, it builds in previous experiences.			
Yes, it is informed by both (data and previous experiences on skills intelligence).			
No.			
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.			
Pathfinder utilises the Saurus content management system and the Zend framework. • Interactive online tools • Online wiki • Online counselling • Open source The platform on which the Pathfinder career planning portal is implemented uses the Saurus content management system as well as the Zend framework. The basic technological infrastructure includes mid-size 'rackable' servers as well as a central data storage, upon which a VMware Hypervisor runs and enables the content management system of the platform to be seamlessly and constantly operational. Information security is safeguarded via a dedicated framework 'Three- level IT baseline security system', ensuring that data availability, integrity and confidentiality are kept at a high level.			
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)			
Quantitative results 288 956 unique users of the portal in 2016, corresponding to almost 22% of the Estonian population. Quantitative results Pathfinder contributes to:			

- empowering users to develop career management skills;
- breaking down stereotypes of gender and age and promoting equal opportunities for career guidance in Estonia;
- enhancing the capacity of practitioners to support better their target groups;
- reducing early school leaver rates within the Estonian education system;
- fostering closer cooperation among guidance professionals and stakeholders.

Follow-up survey addressing users shortly after their experience with Pathfinder services;

- Users, practitioners and stakeholders provide feedback through the dedicated contact point available at the portal;
- The agency conducts surveys on a larger scale every few years.

PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT

Users have the opportunity to search for, identify, contact and/or schedule an appointment with a Pathfinder practitioner close to them to access quality and more personalised support.

Parents are vital allies, while teachers and career coordinators play a leading role in the integration of career guidance within the Estonian education system. Data and information published by public authorities and institutions serve as the principal source of LMI, while businesses also contribute.

PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE

<https://rajaleidja.innove.ee>

https://www.facebook.com/rajaleidja/?locale=et_EE

<https://www.instagram.com/harno.ee/>

<https://www.youtube.com/@HaridusjaNoorteamet/featured>

TAGS (initial proposal)

Pathfinder game, career guidance, career education, career information

CHECKLIST FROM LITERATURE REVIEW

1. Development/use of information systems	✓
2. Digital skills for VET teachers/trainers	
3. Digital skills for learners	
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	
8. Digital technologies in career education and guidance	✓
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	
12. Changes of the roles of practitioners/educators/counselors due to ICT	✓
13. Digital resources	✓

ANNEX 1.10

KYVYT.FI

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Providing organisation: Discendum Ltd	National/Finland
NAME OF THE INITIATIVE/POLICY	
KYVYT.FI	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://kyvyt.fi	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
1. Career management skills 2. Access to lifelong guidance services 3. Guidance practitioner training and qualifications 4. ICT in lifelong guidance 5. Raising the skills and qualifications of young people 6. Raising the skills and qualifications of adults 7. Improving employability and supporting older workers	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
Kyvyt.fi is a personal learning environment and an ePortfolio service that allows gathering of all educational and professional information in one place during one's lifetime. For learners, Kyvyt.fi acts as a place where they showcase their skills and know-how. Users can integrate content that has been created elsewhere, for example YouTube, Google Drive, Microsoft OneDrive, SlideShare, Picasa, etc. This content is entered in Kyvyt.fi by each respective user. Teachers and career counsellors use the tool to monitor the progress of the learners/users. Kyvyt.fi can also be applied in a workplace environment where supervisors can monitor and assess their employees' and trainees' skills and training process.	
MAIN CHALLENGES ADDRESSED BY THE INITIATIVE	
Challenges addressed • Improve matching between skills and jobs • Promote self-assessment • Aid transition from school education to career selection • Improve guidance/employment services Knowledge exchange (among education professionals, guidance counsellors, etc.) • Raise guidance awareness • Tackle unemployment Teachers and learners • Strong LMS culture emphasises the teacher's role: controlling and monitoring the learning processes. • As a PLE and a social media application, Kyvyt.fi is challenging also for learners who are used to being monitored. • Trust and taking responsibility are needed. • Learning to use a new system is always a challenge for teachers Organisations and authorities. • Organization level strategy often missing. • ePortfolio is not seen as a core system (LMS is). • IT departments are not interested in supporting a service they don't own. • Authorities have a positive attitude towards our venture, but some work is needed to achieve a good collaboration level.	

Organisations and authorities

- Organization level strategy often missing
- ePortfolio is not seen as a core system (LMS is)
- IT departments are not interested in supporting a service they don't own
- Authorities have a positive attitude towards our venture, but some work is needed to achieve a good collaboration level

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

Main ideas of the Kyvyt.fi concept

- Kyvyt.fi is a service
- User can keep his portfolio after his graduation and use it for free
- Users own the contents they have created
- Users can move or copy their documents and other artefacts from the school's LMS to their portfolios
- Users can easily move their portfolios out of Kyvyt.fi if they wish
- Kyvyt.fi should enable co-operation and networking between teachers, learners, schools and employers
- All educational institutions or companies using Kyvyt.fi operate in the same service

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

- A need and an interest for portfolio solutions expressed by many educational sector clients Portfolio concept understood in many different ways (CV, PLE, ...).
- A few ePortfolio projects implemented in schools without real success.
- No direct competition on the market.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

Success factors

- Lifelong guidance provision
- Highly personalised to user and practitioners needs
- users can integrate different types of media within their portfolios
- Provision of links with social media accounts
- Empowerment of teachers and guidance practitioners to offer better services to learners
- Ease of adopting the service and no setup cost or other kind of installation
- Higher customisation of the ePortfolio to the Finnish context and to the needs of its specific target groups due to the open source software

Points of attention

- The Mahara software does not support the use of multiple languages.
- Numerous features require training by end-users.
- Learners are sceptical about making their content available to others.
- Low interest by employers.
- Difficulty of education institutions to participate in a generic platform.

Response from the field

- Good response from teachers and learners
- Positive attitude of authorities
- Kyvyt.fi community is growing fast
- Some interesting projects already implemented
- According to learners and most of teachers Kyvyt.fi is quite easy to use

Response from the field

- Overall context of Finland promoting digitisation of services and pushing the uptake of ICT and LMI methods within the national lifelong guidance system.
- More customised individual learning programmes for learners also affecting career education.

TARGET AUDIENCE		ADDRESSED TO	
Upper secondary school learners; vocational institutions; higher education institutes; associations.		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable)	
Today Kyvyt.fi is used by more than 12.000 users and 100 organizations		OTHERS (Youth exploring/transitioning to the labour market)	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	-	Start date: 2010	Pilot/temporal
Mixed			Ongoing
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			
The commercial roll-out of Kyvyt.fi is targeted at institutional level, with organisations paying an annual fee for the basic service that ranges from EUR 300 to EUR 2 500, depending on the size and type of the organisation (colleges, universities, corporations and organisations).			
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?			
Yes, it is informed by research.		If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:	
Yes, it builds in previous experiences.			
Yes, it is informed by both (data and previous experiences on skills intelligence).			
No.			
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.			
• Interactive online tools • Personalised information storage • Social media utilisation • Open source • e-portfolio The Kyvyt.fi ePortfolio service is based on the Mahara software; it also includes features that are not open source since they are the product of Discendum. ICT infrastructure requirements are limited to a web server and a database server. Special attention has been paid to ensuring data protection:			

- several levels of security measures are implemented;
- physical access to servers is restricted and only authorised personnel is allowed;
- backup is applied daily;
- users determine which content to share and with whom;
- all servers hosting Kyvyt.fi data are located in Finland.

EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)

Quantitative results: Kyvyt.fi is currently being applied to nearly 200 organisations and 60 000 end-users. Around 57 000 end-users have created their ePortfolios on Kyvyt.fi.

Quantitative results: The practice enables the acquisition of important content management systems, empowers end-users to showcase better their skills and competences, as well as helping employers to distinguish the job candidates fit for their skills needs and supporting the duties and responsibilities of teaching staff and guidance practitioners.

Evaluation process: Feedback is received via the Kyvyt.fi helpdesk.

PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT

- Kyvyt.fi is growing as a national ePortfolio service
- Successful promotion strategy - service, traditional portfolio, PLE, networking
- Much to do on the pedagogical field
- The biggest challenge is to come up with a profitable business model for an ecosystem service
- Dealing with an ecosystem is a challenge by itself

PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE

https://www.facebook.com/kyvyt.fi/?locale=es_LA

https://spinverse.com/wp-content/uploads/2018/04/Heli_Karjalainen.pdf

<https://www.youtube.com/watch?v=mQ1iiUzajw8>

https://www.youtube.com/watch?v=avaplVhZBnk&list=PLqC5yfvHOX8IL_6sWlCk2DLrsGKTWMWrh&index=2

TAGS (initial proposal)

ePortfolios, competences, lifelong development, career guidance

CHECKLIST FROM LITERATURE REVIEW

1. Development/use of information systems	✓
2. Digital skills for VET teachers/trainers	
3. Digital skills for learners	
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	
8. Digital technologies in career education and guidance	✓
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.11

Digitalization of national TVET and skills systems: harnessing technology to support LLL.

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
International Labour Organization (ILO)	Not applicable
NAME OF THE INITIATIVE/POLICY	
Digitalization of national TVET and skills systems: harnessing technology to support LLL	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://iloskillskspstorage.blob.core.windows.net/development/resources/5122/Digitalization_national_TVET_skills%20systems_EN_Web.pdf	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
This guide has been developed to support ILO constituents take a more strategic approach to the digitalization of national TVET and skills systems.	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
It presents a system level digitalization framework, provides an overview of the main issues surrounding digitalization across all aspects of skills development, gives a useful introduction to key frameworks and tools that support digitalization, and presents numerous concrete examples of national initiatives from around the world.	
MAIN CHALLENGES ADDRESSED BY THE INITIATIVE	
A crisis like the COVID-19 pandemic heightens the opportunities for change, even regrowth. On first glance the pandemic has delivered the game-changing reason to digitalize education systems – to support remote learning. It is a necessity, so argument is superfluous. In the foreseeable future, the need to sustain online delivery remains an obvious imperative for digitalization of those aspects of TVET and skills development. However, although effective online delivery will become a staple requirement of TVET and other education sectors, it is only part of the challenge. The disruption of education has been accompanied by even more drastic disruption of large parts of the labour market in most countries. There has never been a greater need to identify employment patterns, analyse changing jobs and skilling requirements, and match people to opportunities, and all with unprecedented urgency and haste. An efficient, responsive and data-driven skills development and employment services system is needed more than ever. Other key imperatives for digitalization remain, heightened in various ways by the impact of the pandemic: • To improve the relevance of training products to the labour market • To enable data-driven decision making and inform improved supply side planning • To improve quality, efficiency and reliability • To enable an expansion of learning opportunities • To increase access to and participation in the labour market through skills development • To offer curriculum for a digital world • To increase the credibility of the sector • To enable linking the different parts of a skills system • To provide innovative online and blended training options • To enable national, regional and international networking t	

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

This framework includes:

- A description of the key components of national skills systems and the key processes associated with them;
- An overview of the digital TVET context with examples of initiatives at the national, sectoral and local levels from around the world;
- A collection of relevant and adaptable digitalization models and practical guides;
- A set of initial implementation guidelines for digitalization.

The analysis is based on a conceptual framework – Building Blocks of Skills Development Systems – where the ‘building blocks’ identify the five high-level functions of a skills development system. These are:

- Policies, Structures and Resources for Skills Development.
- Anticipating, Planning and Monitoring Skills Development.
- Developing, Certifying and Recognizing Skills.
- Improving Access to Skills Development and the Labour Market for All.
- Skills for Employability, Decent Work and Productivity in the Workplace.

For each of these five building blocks, the framework includes summaries of the key issues and challenges related to the digitalization of that area of a skills for consistency. In addition, where opportunities to improve access and learning outcomes through digitalization have emerged, these have also been highlighted. Finally, for each building block, recommendations are provided to guide the digitalization of inclusive TVET and national skills systems.

In reviewing models and country examples, the basic or sometimes legacy approaches to digitization of TVET and national skills systems have been described to provide examples for countries who are still early in their digital journey, but at the same time, innovative models and leading-edge practices have been identified which can illuminate the next generation of tools and services and offer inspiration for those countries further along their digital journey.

Although there is very little firm comparative data on ‘what works’ in implementing digitalization and managing its transformative impact on TVET and skills systems, they have ventured in places to highlight initiatives and approaches which have special promise. This is especially true of the summary section on building capability, which presents a number of provocative ideas about workforce training in TVET.

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

1. Lessons from the pandemic

The 2020/21 global closure of educational institutions due to COVID-19 caused disruption in education and training as TVET institutes rapidly pivoted to online delivery. There is evidence of some poor practice in distance provision as well as interesting digital innovations. Existing inequities were exacerbated and put marginalized groups at further risk of exclusion. Key findings from an ILO/World Bank/UNESCO survey in May 2020 led to seven observations about the TVET response:

- Many countries and stakeholders in the TVET sphere were insufficiently prepared to respond adequately and swiftly to the shock caused by the COVID-19 pandemic.
- For many TVET providers, the switch to remote learning has been a process of learning by doing.
- The COVID-19 pandemic has accelerated many changes already under way in training systems and labour markets, such as digitalization, but has also been a major disruptor for economies and societies.
- The need for a rapid response to school closures has substantially increased the understanding of distance learning, appreciation of its benefits, and awareness of its challenges.
- The COVID-19 crisis has also provided the impetus to create or strengthen public-private partnerships and collaboration in TVET.
- Substantial constraints have prevented the continuation of good quality TVET provision for all population groups, in particular those in lower-income countries and more vulnerable households.
- Policy responses and remote learning options have struggled to deliver on some of the key features of TVET, namely the acquisition of practical skills and work-based learning.

2. Lessons from the field

Skills training institutions are experiencing a period of disruption driven by technological advances and exacerbated by the recent demand for remote service provision caused by the COVID-19 global pandemic. These disruptive innovations affect both teaching and learning as well as institutional processes and are accelerating digitalization at the institutional level. This is happening in an environment in many countries where all aspects of skills systems are moving towards digitalization.

Experience shows that digitalization models that work best have understood people first and digital technology second, with solid change leadership and stakeholder partnerships being a key to successful change. The formulation of this framework is based on this premise.

In this scenario of digital transformation, education and training systems have both external and internal pressures. First, they must respond to the external demand for skills from the digital society and the transition to new world of work, second, as other sectors, they have to engage themselves in digital transformation and the challenges that presents to institutions and staff.

On the demand side, digitalization and technological development is changing the nature of occupations and the skills required in different jobs across all economic activities. Digital transformation means that many of the existing work tasks within traditional jobs will be modified and that some jobs may disappear. Many existing tasks will be complemented by technology. New skills will be demanded, including the combination of digital skills, and traditional core employability hard and soft skills. The development of new work organization modes, induced by digital technologies, such as some non-standard jobs or work in the digital economy, also modify firms' human resource strategies with respect to training and skill acquisition from the market. Real time data and data analytics also penetrate the anticipation and matching function and require new capabilities of labour market institutions and experts, complementing traditional labour market information systems with a more timely monitoring of changing demand for skills.

On the supply side, changes in the modalities of access and learning, assessment and certification are being driven by the increasing use of digital technologies. The use of Open Educational Resources (OER) and the development of Massive Online Open Courses (MOOCs) and blended learning options are increasing the development of more flexible learning pathways. The application of digital technologies through augmented and virtual reality tools, gamification, machine learning and artificial intelligence in education and training is supporting development of new teaching and learning tools and pedagogies and improved monitoring of the teaching and learning processes. Technology is also transforming work-based learning and apprenticeships, not only through improved pedagogies and customized content, but also by facilitating more informal variants such as virtual apprenticeships and internships and other mentored-learning programmes. It is also having an impact on multi-channelled career guidance, self-help services and digital portfolios, which enable individual-centred learning, empower the self-employed and will be fundamental for a new age of digital learning. New forms of certification including digital credentials and open and online badges are also supporting recognizing and validating learning outcomes including non-formal and informal learning, while connecting learners' records is facilitating mobility of learners.

The ultimate aim of digital transformation must be to deliver successful skills development policy outcomes whilst avoiding the pitfalls of professionalization and privatization that can accompany the introduction of educational technologies.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE.
(Enablers, challenges faced, and solutions applied)

Using technologies for stronger labour market skills needs anticipation

- Benchmark relevant national labour market analysis systems to identify digitalization options which can improve efficiency and effectiveness.
- Review the national LMI network and system for gathering, analysing, and publishing LMI to identify gaps or weaknesses and new digital solutions available to improve performance.
- Improve collaboration between ministries and national agencies in charge of LMI, Education, and Employment, due to the interdependency of collected and utilized data.
- Establish Research and Development teams and/or expert profiles in frontier technologies within Ministries of Labour, Employment and Education to ensure a dynamic and integrated approach to labour market planning is taken, and that new technologies applied to LMI are being anticipated, piloted, and implemented according to the local needs and organizations.

- Review the national processes for aligning skills supply and demand, and (where relevant) consider the business case for implementing national skill standards to deliver training outcomes which more reliably meet identified demand.
- Ensure dynamic evolution of TVET skills development curricula, working on establishing dynamic and closer links with the industry/sectors to inform the design and delivery of in-demand skills and training offers, thus maximizing employability and learning outcomes.
- Adopt a user-centric approach to designing client-facing solutions that use data visualization tools to provide relevant data aligned with end-users needs.
- Make sure to include end-users in the design stages, and anticipate communication and training for all staff members, to ensure efficient uptake and adoption of the new tools and processes.

There are several key benefits of using AR and VR for skills training

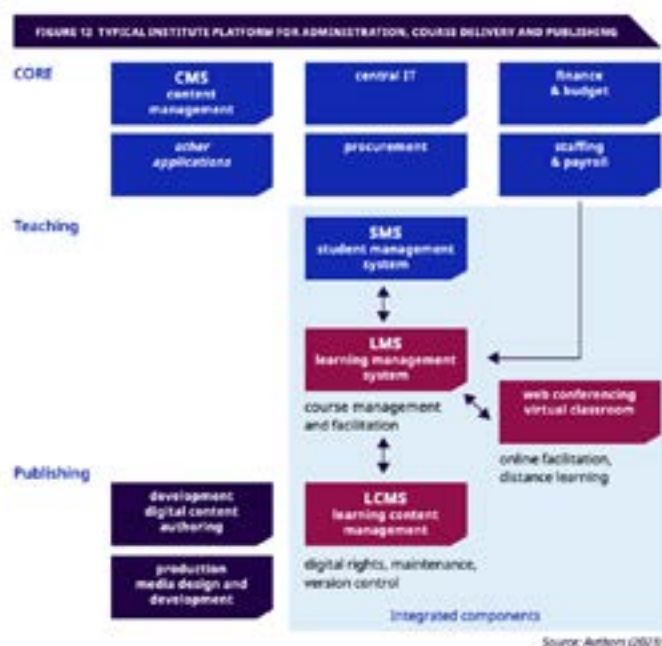
- Support learners to understanding abstract concepts through investigating 3D models.
- Explore workplace scenarios and practices in a safe way by eliminating real-life hazards.
- Foster innovative approaches, exploring areas you would not try to explore in a real-life environment.
- Contextualize classroom learning with real-life work environments.
- Increase student engagement and encourage hands-on learning.
- Produce cost-savings and ensure a more sustainable training approach in many industries in comparison to equipment and raw or industrial material costs.
- Reduces time spent in training.
- Include learners that may not have access to workplace learning or industry-relevant equipment.
- Add attractiveness for training in occupations that might traditionally be gender sensitive.

Artificial Intelligence (AI) is also increasingly being incorporated in TVET. A key area is in student feedback and assessment. When integrated into an LMS or AR/VR, AI can use the data from these platforms and technologies to provide personalized and rapid feedback on student learning. This assessment capability may give learners more detailed feedback than they would otherwise receive from an instructor. It can also be applied to identifying at-risk learners and offer more consistent assessment by reducing reliance on a trainer's judgement.

TARGET AUDIENCE		ADDRESSED TO	
N/A		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS			
N/A		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable)	
		OTHERS (Youth exploring/transitioning to the labour market)	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	-	Start date:	Pilot/temporal
Mixed			
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			Ongoing
N.A.			

IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?	
Yes, it is informed by research.	If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:
Yes, it builds in previous experiences.	
Yes, it is informed by both (data and previous experiences on skills intelligence).	
No.	

DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable).
Please specify if the initiative/policy uses any type of emerging technology.



EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)

Not applicable.

PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT

Not applicable.

PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE

https://iloskillskspstorage.blob.core.windows.net/development/resources/5122/Digitalization_national_TVET_skills%20systems_EN_Web.pdf

TAGS (initial proposal)

Guide/framework, skills systems, national initiatives, digital tools

CHECKLIST FROM LITERATURE REVIEW

1. Development/use of information systems	
2. Digital skills for VET teachers/trainers	
3. Digital skills for learners	
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	
8. Digital technologies in career education and guidance	

9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.12

E-VET4AI.

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
e-VET4AI	Germany, Italy, Spain, Greece, Belgium
NAME OF THE INITIATIVE/POLICY	
e-VET4AI (e-VET Trainers 4 Artificial Intelligence)	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://evet4ai.eu/	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
To support trainers active in mechanical training courses, in the development of new digital skills and confidence in the use of new teaching methodologies, to be integrated within more traditional teaching methods on mechanical segment (Industry 4.0).	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
The project supports trainers active in mechanical training courses, in the development of new digital skills confidence in the use of new teaching methodologies, to be integrated within more traditional teaching methods.	
MAIN CHALLENGES ADDRESSED BY THE INITIATIVE	
Focusing on the mechanical segment of VET is suggested by the severe impact that the health emergency generated on the engineering sector the final recipient of the VET activities.	
BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE	
This framework includes: • A description of the key components of national skills systems and the key processes associated with them; • An overview of the digital TVET context with examples of initiatives at the national, sectoral and local levels from around the world; • A collection of relevant and adaptable digitalization models and practical guides; • A set of initial implementation guidelines for digitalization. The analysis is based on a conceptual framework - Building Blocks of Skills Development Systems – where the ‘building blocks’ identify the five high-level functions of a skills development system. These are: • Policies, Structures and Resources for Skills Development. • Anticipating, Planning and Monitoring Skills Development. • Developing, Certifying and Recognizing Skills. • Improving Access to Skills Development and the Labour Market for All. • Skills for Employability, Decent Work and Productivity in the Workplace.	

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

The initiative responds to the main goal in this way:

- Increasing the digital skills of trainers, using the DigCompEdu framework.
- Implementing blended and distance training methodologies, including international cooperation.
- Identifying and test digital tools to support IVET, particularly on topics related to Industry 4.0.
- Increasing the digital readiness of IVET institutions on class-based teaching, especially in industrial and technical VET programs.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

- Needs: As the impacts of pandemic also affected the VET system, the overall picture across Europe emerged the strong fragmentation and lack of homogeneity, along with the relative difficulty of systemizing and scaling the different experiences. Hence the need for a systematization of good practices at European level, as well as the development of a learning model that starts from the self-assessment of the digital skills to the personalized design of learning content. On 29th March the consortium organised an online Working table with Anastasia Economou, project leader of the SELFIEforTEACHERS tool. This meeting was a great occasion to deepen the partnership's knowledge in the field of digital proficiency for trainers.
- Rationale: They consider necessary to invest in trainers' digital skills, providing tools to support online teaching, and in technologies. In the light of this comes the project 'e-VET for Artificial Intelligence' (e-VET4AI) particularly focused on the mechanical segment (Industry4.0).
- The initiative offers a learning platform with four parts:
 1. Self-awareness tool (SAT): Includes 5 areas (Big data, Artificial Intelligence, Machine learning, Digital Twin and Augmented reality).
 2. Case studies: offers 40 examples of the use of different technologies in the mechanical production sector. They are organized by the 5 areas mentioned before.
 3. Training modules: presents 5 free courses (one per area): Artificial Intelligence (15 modules); Augmented Reality (14 modules); Big Data (13 modules); Digital Twin (25 modules); Machine Learning (8 modules). The participant can receive a Certificate depending on the % of modules completed. Each topic has a dedicated area with modules that provide a general introduction and definition of the technologies and focus afterwards on aspects such as their functioning and technical aspects, possible applications, examples as well advantages and disadvantages of these technologies. By the end of each module, you will be able to take a test to assess your newly acquired skills and knowledge. The modules are offered in 6 languages (English, French, German, Greek, Italian and Spanish)
 4. Tools for teachers: A guide that equips teachers with practical strategies and tools to implement collaborative challenge-based learning. It covers designing engaging real-world challenges, facilitating active student collaboration, monitoring progress, assessing outcomes, and continually improving the learning experience. The guide provides an actionable framework to foster critical thinking and problem-solving skills through student-centered, team-based challenges. The support is personalised as the teacher/trainer can subscribe her/himself.
 5. The e-VET4AI partnership has created an ecosystem in Europe. The network is opened for participation of professional trainers.
 6. e-VET4AI aims to initiate a process of OPEN INNOVATION in which the European IVET systems are open to practices developed in other contexts through the sharing of a VIRTUAL LEARNING SPACE.
 7. Results:
 - e-VET Self Awareness Tool (e-VET SAT) for Digital Proficiency: built around the areas of DigCompEdu, aims to test the level of Digital Proficiency of trainers and outlines the progressive acquisition of skills and practices able to advance them on the scale of reference.
 - e-VET4AI training model (e-VET4AI TM): is an online training toolkit addressed to the mechanical training system with a focus on Artificial Intelligence and Data Analytics, that allows trainers to test the developed materials, also measuring their ability to use innovative digital tools.

TARGET AUDIENCE		ADDRESSED TO	
• Trainers from Europe. • VET institutions & eVET institutions • Vet trainees (learners and workers). • Metalmechanical companies. • VET Educational providers. • Teachers' assistants • Engineering companies • Other stakeholders		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable): Mechanic segment	
Teachers and trainers in VET in Europe		OTHERS (Youth exploring/transitioning to the labour market)	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	1. ITKAM – Italienische Handelskammer Fur Deutschland, from Germany 2. SIAV- Confindustria Veneto SIAV S.p.A., from Italy 3. HETEL- Asociacion De Centros De Formacion Tecnico Profesional De Iniciativa Social De Euskadi Hetel Heziketa Teknikoko Elkartea De Durango (Bizkaia), from Spain 4. Consorzio ecole – Ecoles – Enti Confindustriali Lombardi Per L'education – Societa' Consortile A R.L., from Italy 5. p-consulting.gr, from Greece 6. CBE – Cooperation Bancaire Pour l' Europe, from Belgium 7. Qualifizierungszentrum Region Riesa GmbH, from Germany	Start date: 2021 Ends: October 2023	Pilot/temporal
Mixed			Ongoing
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...) Project co-financed by EU 2021-1-DE02-KA220-VET-000030542 Budget:			

IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?	
Yes, it is informed by research.	If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:
Yes, it builds in previous experiences.	
Yes, it is informed by both (data and previous experiences on skills intelligence).	
No.	
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.	
Artificial Intelligence; Augmented Reality; Big Data; Digital Twin; Machine Learning. The project offers training modules for each technology. Each module provides a general introduction and definition of the technologies and focus afterwards on aspects such as their functioning and technical aspects, possible applications, examples as well advantages and disadvantages of these technologies. By the end of each module, you will be able to take a test to assess your newly acquired skills and knowledge. The proposal is based in an previous phase for identifying and recording best practices in terms of training aimed at the acquisition of knowledge and skills in AI by learners, and in terms of the use of AI tools by VET institutions. On the other hand, the project offers guidelines to guide teachers in bridging the gap between the knowledge and skills related to AI in VET and practical teaching for learners. The guide offers strategies and recommendations for effectively applying the knowledge and skills acquired from the e-vet4ai online courses in their everyday classroom practices.	
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)	
At the end of the project Each partner organised its own multiplier event and Go Live of the Learning Platform, showcasing the project results and sharing the training model developed by e-VET4AI with its local ecosystem. The partners celebrated meetings for monitoring and a Final Conference to disseminate the two approaches followed by the project: the application of artificial intelligence in training, focusing on how artificial intelligence can improve training provision, the orientation of teachers and trainers in artificial intelligence, and what are the main technologies applied in the engineering sector, how they are applied, their purpose and the needed skills. There are no other public results	
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT	
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE	
- Guidelines for teaching: https://evet4ai.eu/wp-content/uploads/2023/12/e-VET4AI_PR3_A4_Guideline_V3_EN.pdf - Newsletter 1: https://evet4ai.eu/wp-content/uploads/2022/09/NewsLetter-new-3.0_EN_compressed.pdf - Newsletter 2: https://evet4ai.eu/wp-content/uploads/2023/02/EVET4AI-NewsLetter-2-2-2023_ENG.pdf - Newsletter 3: https://evet4ai.eu/wp-content/uploads/2023/07/e-VET4AI_Newsletter-No3_July2023_EN_compressed.pdf - Newsletter 4: https://evet4ai.eu/wp-content/uploads/2023/12/e-VET4AI-NewsLetter-4-12-2023_EN.pdf	
TAGS (initial proposal)	
Artificial Intelligence, Teachers and trainers' education, digital skills, innovative methodologies	
CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	✓
2. Digital skills for VET teachers/trainers	✓
3. Digital skills for learners	
4. Development of socioemotional & transversal skills	✓
5. Transformative potential of blended and online learning	✓

6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	✓
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	
12. Changes of the roles of practitioners/educators/counselors due to ICT	✓
13. Digital resources	✓

ANNEX 1.13

TKNIKA.

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Basque VET Applied Research Centre	Basque Country (Spain)
NAME OF THE INITIATIVE/POLICY	
TKNIKA	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://TKNIKA.eus/en/ https://TKNIKA.eus/en/about-TKNIKA/contact/	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
To make research and applied innovation core fundamental elements of Vocational Education and Training in Euskadi, to make progress in new learning settings and processes, and to reduce the skill gap from when an idea or technology comes about until society can take advantage of it. By means of watch and competitive intelligence, design, development, implementation and transfer of innovative products and services of high added value to Vocational Education and Training centers, and from thence, to the Through a dynamic open to collaboration and establishing alliances, fomenting the creation of networks, teamwork, creativity and sustainability.	

DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR

The future that TKNIKA aspires to in the short- and mid-term is to be THE European leader in the application of advanced practices in capillary transfer of knowledge to the business network, through the vocational educational training schools. To this end, TKNIKA plays the role of an organization that researches and innovates in different fields for the Euskadi VET system. It intends to act as a driving element to facilitate and boost innovation developed by VET institutions.

Its activity's expected impact is focused on creating innovative knowledge that provides added value to the development of skills and knowledge (technical and cross-cutting) for teachers at schools in the Euskadi VET system, in order to be transferred through its own to different service recipients (learners, companies, active workers, the unemployed, society, etc.)

Research+Development+innovation

MAIN CHALLENGES ADDRESSED BY THE INITIATIVE

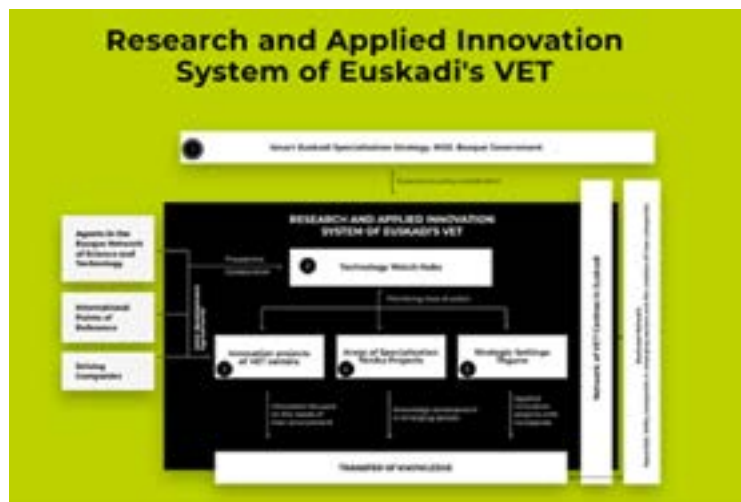
To be THE European point of reference in applying advanced practices to transfer knowledge to the business network through vocational training centers. One of these areas is Technological innovation and intelligent systems.

They have a specific area called Technological Innovation and Intelligent Systems Area which aim is to reduce the time that elapses between the emergence of a technology and the fact that Basque society benefits from it, and to research technologies that allow the development of new market niches in the Basque Country.

On the other hand, in the *Learning and High performance Area* they consider that the systems of vocational training must adapt so that it becomes a form of **Intelligent Vocational Training** based on high-performance learning. In this way it will address current needs and emerging and unknown environments. In the context of preparing 'talented professionals' they consider that they cannot ignore the digital transformation that is taking place and its influence on the teaching-learning process. The key to this entire transformation is obvious: the human factor. And in this regard, they are focusing our efforts on the humanistic leadership skills that new professionals must have. In this area, they are developing learning strategies that apply the principles of critical thinking, constructive thinking and creative thinking, thus promoting the development of the new professional profile, the talented professional, emotional intelligence, creative intelligence and executive intelligence.

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

- Agreements with other organisations. With these agreements, they open up new pathways for research and innovation to meet new trends on the rise that have been detected within a context of mutual, win-win collaboration.
- They work through 6 areas. One of them is the Technological innovation and intelligent systems Area. They have the Basque Vocational Training Applied Research and Innovation System, which seeks to support society and especially SMEs in the challenge of competing in an environment that demands a high added value. This system is based on the Basque Government's Intelligent Specialisation Strategy, which establishes the priorities that are deployed from the 6th Basque Vocational Education and Training Plan, through TKNIKA and the VET centres.
- From here on, they set up a surveillance process organized through the so-called Network Hubs. The information collected is processed and communicated to the VET system centres so that they can propose initiatives aligned with it. The initiatives are prioritised, selected and developed through different programmes. Finally, the results obtained are transferred to the other vocational education and training centres and to SMEs. They detect the topics of interest in which, due to their complexity or lesser degree of maturity, require greater dedication in order to be able to be adapted to the needs of Vocational Education Training.



Source: <https://TKNIKA.eus/en/areas-2/technological-innovation-and-intelligent-systems/>

- In the Learning and High performance Area they develop a smart VET based on High-performance training, enriched by different programs: Ikasempresa (development of the entrepreneurial culture); Values 4.0 (vision of social transforming) and Steam (development of scientific thought). This is supported by a network environment and learning opportunities for teachers to response to introduction of the collaborative challenge-based learning model (ETHAZI) and advice on the diagnosis, design, development and deployment of learning models. The network includes as a key participant ICT teachers: They are the driving force behind the digitalisation of the learning process. They are part of the digital transformation teams, made up of figures such as the facilitator, the promoter, the coordinator of the digital transformation, the person responsible for infrastructures, and the executive management. In a situation in which we are discovering more and more quickly, the help provided by digital media in the learning process, ICT teachers anticipate, adapt, and improve educational actions through the most suitable technologies. They offer a repository of pedagogical resources (competencies and evaluation, challenges, team techniques). The ETHAZI mode includes digital competencies learning
- Vocational training centres and their teachers are lent resources so that they can use them in their day-to-day work. The resources lent to teachers go along with projects that are already finished, as well as projects that are underway, as long as it is determined that said loan shall not affect the project's pace. These resources are mostly of a technological nature. Some examples: Pam Stam 2G (software to simulate the sheet metal forming process); Quick Cast (software to simulate methallic alloy moduling processes); SimSpray (virtual reality).
- They also offers courses and a repository of EU projects in which the Basque country's centers participate.

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

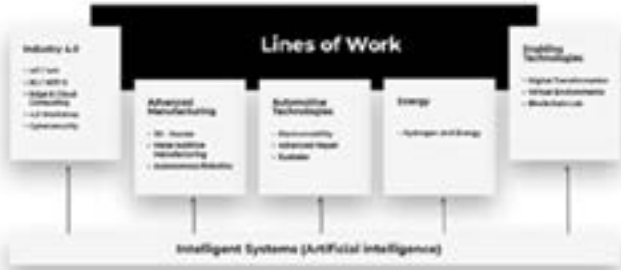
- The have an innovation strategy which key elements are:
 - TKNIKA innovates based on both incremental and disruptive focuses, always referencing knowledge currently unavailable within the Euskadi Vocational Educational Training system.
 - The focus of research and innovation prioritizes innovation in service (new knowledge applied to the educational offer and services at the schools), in processes (learning process), in new management models (school management), and research and innovation applied to the product (through technical-technological projects).
 - TECHNOLOGICAL INNOVATION AND SMART SYSTEMS The lines of research and innovation currently under development are related to the fields of Industry 4.0, Advanced Manufacturing, Automobile Technology, Energy, and Enabling Technologies. In each one of these fields, we identify the main topics of interest for Vocational Education Training and start up areas of specialization. Our objective is to master them and provide training to teachers, thereby accelerating the access of learners trained in new technologies to the job market.
 - MANAGING COMPLEXITY The lines of research and innovation currently under development mid-term are focused on driving knowledge creation, in order to change management models at Euskadi Vocational Educational Training schools toward smart organizations that manage intelligence.
 - LEARNING AND HIGH PERFORMANCE/Digital transformation The lines of research and innovation that they are developing are focused on the consolidation and enrichment of the ETHAZI model, the accompaniment of the centres in the definition and deployment of the implementation strategy appropriate to their characteristics and the promotion of initiatives to have ``talented professionals`` in VET Euskadi, hence this area is being transformed into a differentiated entity. iTlent through which we want to reach even more to the Basque Vocational Training centres in the accompaniment of the ETHAZI model and talent management. Likewise, this transformation entails the design and creation of the Digital Transformation area, through which the digital transformation already initiated in the Basque Vocational Training centres will be promoted, and designed in the VI Basque Vocational Training Plan, for which different actions will be carried out.
 - INTERNATIONALIZATION The lines of research and innovation under development are focused on leading TKNIKA and the Vocational Educational Training schools' internationalization strategy and activities. We do this via the following actions, among others: We establish international teacher exchange programmes, encouraging the exchange of good practises. We foment active participation in leading international Vocational Educational Training networks that provide knowledge and exchange experiences. We foment international research projects under international research and innovation programmes related to Vocational Educational Training.
 - APPLIED INNOVATION IN STRATEGIC SETTINGS The lines of research and innovation currently under development in the area of applied innovation in strategic settings are oriented toward developing the capacity of the Basque network of Vocational Educational Training schools to drive innovation in the business network. We seek to develop new skills and attitudes necessary to consolidate change and transformation through innovation and entrepreneurial initiative, under the framework of the company participating in the learning process.
 - BIOSCIENCE AND SUSTAINABILITY The lines of research and innovation currently under development are for Vocational Educational Training to drive a production model based on the efficient use of existing resources, broadly and comprehensively, as support for the sustainable economy that we have the obligation to build, for our own benefit and for the benefit of future generations. To this end, we are currently working on sustainable human development in social, environmental, economic, and cultural fields.
 - In all these fields, we are rolling out a prospective and vigilant strategy to question and constantly update lines of work under development, so as to anticipate future needs of the VET system and of VET institutions and plan the construction of projects and services with the greatest added value possible.

- Other fields. Another priority point is the Vice-Ministry's strategy. We participate in both its design and its roll-out. Consequently, the strategies to be developed from the vice-ministry will be modified, updated, and added to, as necessary at all times.
- As a general rule, results are transferred and used openly, making them available to all interested parties, especially VET institutions and their teachers. The intangible assets, knowledge and materials generated by/at TKNIKA are open and free. In specific situations at TKNIKA's discretion, the authorship and ownership over intangible goods will be protected, and/or appropriate legal means shall be used to do so.
- Elements of the Technological Innovation and Intelligent Systems Area
- Smart euskadi Specialisation Strategy: Vocational training makes sense based on its alignment with Basque Government policies. To this end, besides keeping watch over and knowing said policies, TKNIKA applies them when prioritising the projects to be worked on. Euskadi's vocational training is a fundamental agent, acknowledged in different scopes (companies, Government, European classes...), so that, represented by TKNIKA, Euskadi's vocational training participates in initiatives oriented toward giving shape to, and rolling out innovation policies.
- Placing focus on benchmark companies in the community, with sights set on future needs that imply challenges, these hubs identify, prioritize and develop differential capabilities for the productive network. To this end, we coordinate with reference-point companies in Euskadi that help us to identify said capabilities, and we propose initiatives and projects to be carried out. For the time being, operational hubs are as follows:
 - Advanced manufacturing.
 - Digital and connected factory.
 - Energy.
 - Biosciences.
- Innovation projects of VET centers: Drawing support from the capability and experience of centres in developing innovation projects and the knowledge surrounding them, VET centres develop projects designed to meet their environmental needs, as well as the needs of innovation itself. TKNIKA participates in selecting projects to be developed from the centres, and we take charge of monitoring them, as well as of guaranteeing all of their transfer objectives. In addition to proposing the projects to be carried out on an annual basis, the centres are responsible for executing them and their roll-out. These are the projects currently carried out at the centres
- Areas of specialization TKNIKA projects: projects with the intent of creating knowledge and training themselves in the indicated emerging areas as priority by Basque Government policies. In this way they provide the knowledge that their professional training centres need in order to collaborate with companies, responding to the present and future needs of the Basque productive sector.
- Strategic settings Tkgune: With the aim of promoting and developing applied innovation in companies, from the VET centers, they develop applied innovation projects with SMEs in the area, using the knowledge, resources and facilities of the network of VET centers.
- Pedagogical approach: ETHAZI Model. Learning strategies that apply the principles of critical thinking, constructive thinking and creative thinking, thus promoting the development of the new professional profile, the talented professional, emotional intelligence, creative intelligence and executive intelligence.



Source: <https://TKNIKA.eus/en/areas-2/learning-and-high-performance/>

- They describe their policies: Innovation policy, economic sustainability, continuous improvement policy, people policy, intellectual property policy.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)			
TARGET AUDIENCE The different VET stakeholders (teachers, researchers, companies...)		ADDRESSED TO VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS The whole Basque Country's VET population		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable) OTHERS (Youth exploring/transitioning to the labour market)	
FUNDING 100% public sector Mixed 100% private (including companies, NGOs., foundations, etc.) Please describe the funding more in depth (source, budget...)	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar) Start date	STATUS Pilot/temporal Ongoing
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?			
Yes, it is informed by research.			
Yes, it builds in previous experiences.			
Yes, it is informed by both (data and previous experiences on skills intelligence).			
No.			
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.			
Intelligent systems (Artificial Intelligence). 5 lines of work (projects) • Industry 4.0: IoT/IoM; 5G/Wifi 6; Edge & Cloud computing; 4.0 Workshop; Cybersecurity. • Advanced Manufacturing: 3D IkaSlab; metal additive manufacturing; autonomous robotics. • Automotive Technologies: Electromobility, advanced repair, Euskelec. • Energy: Hidrogen and energy. • Enabling Technologies: Digital transformation, virtual environments, blockchain Lab. 			
Source: https://TKNIKA.eus/en/areas-2/technological-innovation-and-intelligent-systems/			

EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)	
TKNIKA, RESEARCH AND INNOVATION CENTRE APPLIED TO VOCATIONAL TRAINING, has defined quality management as a fundamental part of its policy and strategy, and has adopted quality-based management systems as reference models for management and organization. The main points of reference are the management model EFQM, the quality assurance system based on Standard UNE-EN ISO 9.001 and Standard UNE166002 for R+D+i management.	
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT	
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE	
Strategic Plan: https://TKNIKA.eus/en/about-TKNIKA/strategic-documents/	
TAGS (initial proposal)	
CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	
2. Digital skills for VET teachers/trainers	✓
3. Digital skills for learners	✓
4. Development of socioemotional & transversal skills	✓
5. Transformative potential of blended and online learning	
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	✓
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	✓
10. Tackling technology-related gender gaps in VET	✓
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	✓
12. Changes of the roles of practitioners/educators/counselors due to ICT	✓
13. Digital resources	✓

ANNEX 1.14

ADDUPT.

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
CENTRO SUPERIOR DE FORMACION EUROPA-SUR SA (Spain, Coordinator). Erasmus Capacity Building in VET.	Western Balkans
NAME OF THE INITIATIVE/POLICY	
ADDUPT- Addressing skills mismatching in the green sector through digital upskilling of VET	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://learning4green.eu/	
CONTACT POINT	

INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
To strengthen VET by building qualification systems, improving learning quality, and continuously developing VET teachers and trainers, focusing on capacity building in Western Balkan countries to enhance vocational education's effectiveness. - To reinforce the link between VET and the labour market of the emerging green sector. - To provide concrete guidance and individualised assistance to Western Balkans VET institutes that want to shift towards twin transition. - To improve the skills and knowledge of Western Balkans VET trainers and staff in developing digital microlearning resources in green-related topics. - To enhance the employability potential of Western Balkans learners through the improved capacity of the VET sector in providing training courses and learning resources that correspond to green sector's requirements in the labour market.	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
- Assessment of the main needs and job requirements in the green sector. - Workshops with experts of the green and VET sector that will review, and assess the results of the need analysis, ensuring maximum level of reliability. - Development and implementation of an integrated Capacity Building Framework for VET to support them shifting toward twin transition and developing digital microlearning resources. - Providing VET action plans and digital microlearning resources answering the identified needs of the green sector.	
MAIN CHALLENGES ADDRESSED BY THE INITIATIVE	
In the Western Balkans, the labour market situation remains challenging, in particular regarding the mismatch between skills and competences offered and the respective ones needed by companies. Within reforms embarked under the accession process to the European Union, the Western Balkans seek to improve the VET sector and its multidimensional component, focusing on building qualification systems, improving the quality of the learning processes, and most importantly ensuring the continuing professional development of VET teacher and training.	
BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE	
Reinforcing the link between Vocational Education and Training (VET) and the green sector* through a capacity building program, including workshops, digital resources and other learning activities and materials aimed at developing and enhancing the skills, knowledge, resources, and abilities of VET organisations. Key elements: - Operational framework of the Mechanism – Objectives, requirements and allocated resources to diagnose business needs in the green sector. - Green sector analysis: Trends and changing needs. - Business needs' diagnosis in the green sector. - Handbook on bridging VET provision and the green business sector – Tools and methods to address green sector business needs into VET curricula. - Guidelines for the development of VET Action Plans – to adapt their curricula to the needs of the green sector - Training Programme for the development of digital microlearning resources answering the needs of the green sector. - Virtual Learning Environment (VLE) for VET trainers/staff – with resources of the Integrated Capacity Building Framework for VET and microlearning resources answering the needs of the green sector. - Individual VET Action Plans – guidelines and enrichment of the VET curricula. - Digital microlearning resources answering the needs of the green sector. - ADDUPT Dissemination toolkit presenting the different dissemination tools of the project (visual identity, website, social media, e-newsletter, videos, graphic factsheets and brochure).	

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

The project aims to address the needs of the VET sector in three Western Balkan countries – Albania, Bosnia and Herzegovina and Montenegro – which face common challenges of skills mismatches between VET provision and employers' needs.

In **Albania**, bridging the gap between existing skills and those required by the labour market is a top priority of national social and employment policy. The number of VET graduates does not match the demand for skilled workers, and their skills often don't match the needs of employers. This mismatch, together with dissatisfaction with the education system, is a major factor driving Albanian migration to the EU. To address this, the Albanian government is focusing on reforming the VET system to improve its quality, relevance, attractiveness, effectiveness and efficiency. Recommendations from the Torino process include improving educational planning to attract more learners and strengthening the professional development of VET teachers and trainers. Addressing gaps in continuous professional development and understanding the training needs of enterprises can help to align VET curricula with the needs of industry. According to the HDPC, inappropriate qualifications of potential employees from the VET sector are a major concern for enterprises (43.2%), while representatives of enterprises and business associations would be willing to participate in a systematic process of developing occupational standards and qualifications.

A similar situation exists in **Bosnia and Herzegovina**, where the lack of a systematic approach and mechanisms prevents the education system, especially vocational education and training, from producing graduates with the skills needed by industry. The challenges are exacerbated by the decentralised management of education policy, which hinders the development of an integrated, nationwide system. Under-utilisation of the capacity of VET trainers has a direct impact on learners' skills development and transition to employment, contributing to high unemployment rates among VET graduates. To address these issues, the Torino Process recommends the promotion of 'joined-up thinking' frameworks to improve cooperation between stakeholders and prioritise the implementation of European initiatives.

In **Montenegro**, skill mismatches persist due to insufficient quality and relevance of training, exacerbated by a rapidly changing labour market, stagnating job creation and slow adaptation of VET to market needs. This affects the level of achievement in VET and the motivation of learners. Many VET learners go on to further education after graduation, indicating that they see VET as a route to higher education rather than vocational training. To address this, the implementation of outcome-oriented curricula and the training of VET trainers in cooperation with industry partners are crucial to improve the adaptability of the sector. The Torino Process proposes key VET reforms such as the introduction of flexible, competency-based qualifications aligned with industry needs, the revision of curricula and the improvement of teacher training.

Taking these into consideration, the ADDUPT aims to:

- Reinforce the link between VET provision in involved third countries not associated to the Programme and the green sector of their labour markets (indicators: expert group workshops convening at least twice a year and consisting of: 2 labour market rep. (e.g., from relevant chambers, professional associations, etc.), 2 green business rep., 2 VET rep., and 1 rep. from local/national educational authorities/WB-partner country),
- Develop a long-lasting, operational Mechanism for Diagnosing Business Needs in the Green Sector (the Mechanism) to facilitate timely, targeted, and comprehensive diagnosis of the green sector's needs and requirements in terms of specialisations, skills, and knowledge (indicators: development of an Operational Framework for the elaboration of the Mechanism, establishment of a 3-stage Mechanism, biannual diagnostics of business needs),
- Provide a thorough analysis on the current situation of the green sector in the third countries not associated to the Programme involved in the Project (indicators: involvement of at least 20 labour market representatives and 20 VET representatives per WB-partner country, delivery of the 'Green sector analysis: Trends and changing needs'),
- Support the exposure of WB-VET trainers and staff to approaches that establish flexible and interactive links between VET and the labour market (indicators: development of the ICBF-VET including the following: - Bridging VET provision and the green business sector: a Handbook, Guidelines for the development of VET Action Plans, 30hour - Training Programme for the development of digital microlearning resources),

- Provide concrete guidance and individualised assistance to WB-VET that wish to shift towards twin transition (indicators: one VET Action Plan per WB-VET),
- Build the capacity of WB-VET institutes to incorporate green labour market needs to their training provision (indicators: at least 66 VET trainers from WB-partner countries participate in the delivery of the capacity building programme and the virtual mobilities),
- Improve the skills and knowledge of WB-VET trainers and staff in developing digital microlearning resources to modernise the provision of VET in green-related topics (indicators: at least 80% of participants to the delivery of the capacity building programme validate their acquired qualifications (ECVET points).

Expected impact:

- 60 participants taking part in capacity building activities.
- 60 microlearning digital resources developed.
- 220 participants taking part in dissemination events.
- Updated VET curricula to match the needs of the green sector.
- Reinforced link of Western Balkans VET and the green sector.
- Built capacities in adopting innovative approaches that can contribute to the improvement of both the quality and attractiveness of VET.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

Too early to tell at this stage of the project as we are currently starting M14 of 36M.

TARGET AUDIENCE		ADDRESSED TO	
VET organisations		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS			
60 participants taking part in capacity building activities.		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable): Mechanic segment	
		OTHERS (Youth exploring/transitioning to the labour market)	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	• CENTRO SUPERIOR DE FORMACION EUROPA-SUR SA (Spain, Coordinator) • Albanian Center for Education Care and Training (ACT CENTER) (Albania) • Centar za ekonomski, tehnoloski i okolinski razvoj – CETEOR Sarajevo (Bosnia and Herzegovina) • ZELENI DOM-GREEN HOME UDRUZENJE (Montenegro) • EUROTRAINING EDUCATIONAL ORGANIZATION (Greece) • CESIE (Italy) • CHAMBER OF COMMERCE & INDUSTRY TIRANA (Albania) • Chamber of Commerce and Industry of Banja Luka Region (Bosnia and Herzegovina) • CSI CENTER FOR SOCIAL INNOVATION LTD (Cyprus)	01/01/2023 - 01/01/2025	Pilot/temporal
Mixed			Ongoing
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			
ERASMUS-EDU-2022-CB-VET			

IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?	
Yes, it is informed by research.	
Yes, it builds in previous experiences.	
Yes, it is informed by both (data and previous experiences on skills intelligence).	
No.	
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.	
- Virtual Learning Environment (VLE) for VET trainers/staff – with resources of the Integrated Capacity Building Framework for VET and microlearning resources answering the needs of the green sector. - Digital microlearning resources answering the needs of the green sector.	
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)	
Ongoing. The quality control is being approached from four angles: Coherence of the project with the workplan (GANTT, budget). Effectiveness of the communication and cooperation processes, as well as satisfaction with the project results. Questionnaires every 6 months. Quality of the project deliverables, considering relevance; soundness; coherence, innovation, and transferability. Key Project results: Until now: 1) D2.2. Green sector analysis: trends and changing needs. 2) D.31. Bridging VET provision and the green business sector: a Handbook. (ongoing). Impact of the project on the target group: stakeholders and sustainability (long-lasting effect) The project remains on track with the Gantt chart and budget and is now in month 14 out of 36. The latest evaluation shows that the communication and collaboration processes are proving effective.	
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT	
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE	
- Operational framework of the mechanism for diagnosing business needs in green sector: https://learning4green.eu/wp-content/uploads/addupt-operational-framework-en.pdf - Green sector analysis. Trends and changing needs: https://learning4green.eu/wp-content/uploads/addupt-green-sector-analysis-en.pdf - Dissemination toolkit: https://learning4green.eu/wp-content/uploads/addupt-dissemination-toolkit-en.pdf - Future documents: https://learning4green.eu/resources/ - Expert Groups Consultation results: To be uploaded soon. - Business Needs diagnosis in the green sector: A Handbook. To be uploaded soon. - digital microlearning resources to adapt their currently provided courses to correspond to the identified needs of the green sector - Integrated Capacity Building Framework for VET and microlearning resources answering the needs of the green sector - Training Programme for the development of digital microlearning resources answering the needs of the green sector	
TAGS (initial proposal)	
Capacity building, international cooperation, teacher training, green and digital economy, digital competencies	
CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	
2. Digital skills for VET teachers/trainers	✓
3. Digital skills for learners	
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	
6. Flexible accreditation mechanisms	

7. Incorporation of emerging technologies (related to industry 4.0)	✓
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	✓
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.15

ODZNAKAPLUS.

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Educational Research Institute	Poland
NAME OF THE INITIATIVE/POLICY	
EFS+ Project: Microcredentials - piloting a new solution to support lifelong learning and Odznaka+ (Badge+) application developed by Educational Research Institute	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://www.facebook.com/microcredentials.polska https://www.linkedin.com/company/microcredentials-polska/ https://odznakaplus.ibe.edu.pl/ Project website under construction, will be available also in English	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
The main and overarching objective of the project is to test the usefulness of microcredentials for development of skills in line with lifelong learning and to design a process for issuing and collecting them. The solutions developed will provide an answer to the Council Recommendation of 22.06.2022 on a European approach to microcredentials, which recommends to Member States, among other things, that through microcredentials: (a) enable the acquisition and updating of knowledge, skills and social competences that ensure success in a changing labour market; (b) support the preparation of providers of microcredentials to increase the quality, transparency, accessibility and flexibility of the educational offer educational offer in order to provide opportunities for individual learning and career paths. At the end the project after the pilot testing (if the pilot go well and it prove usefulness of microcredentials) the project team will developed a tailor solution for implementation of microcredentials in the policy and practise in Poland including legislative change if necessary.	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
• Digital credentialing opportunities for adults. • Creation of IT infrastructure for skills validation, with a particular focus on ICT skills. • Cooperation with VET stakeholders - universities, training institutions, • Promoting the development of ICT skills, by targeting the offer of microcredentials to this skill group.	

MAIN CHALLENGES ADDRESSED BY THE INITIATIVE

To interest individual users in the use of digital credentials for lifelong learning.

Encouraging potential issuers of microcredentials to create and issue them using the Odznaka+ application.

Future integration with the European EDC infrastructure and the introduction of Open Badges 3.0 based on the verified credentials standard into the application.

Establishing changes in the law that will result in the introduction of microcredentials into government policy and practice.

Establishing quality assurance and credibility standards for microcredentials and defining the borderline between microcredentials (supported by future legal developments) and other digital credentials.

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

The project has been divided into 4 main parts, to which the basic tasks of the project correspond:

- developing standards and solutions for designing, describing, issuing and ensuring the trustworthiness and good quality of microcredentials,
- pilot implementation of digital microcredentials skills and achievements,
- developing the usability and ensuring accessibility of the Odznaka+ application as a tool to support the use of microcredentials,
- disseminate microcredentials as a flexible tool for up-skilling and re-skilling in a lifelong learning context (especially for adults) and take steps to embed this in practice or policy.

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

Recently, microcredentials, which – in principle – validate learning outcomes achieved with little effort, have become increasingly popular in various countries. Experiences from countries such as Australia, the USA and Spain, as well as the results of research carried out, for example, by the ETF (European Training Foundation), UNESCO, CEDEFOP and the OECD, confirm the usefulness of microcredentials for building a learning culture – motivating continuous development of skills and validating new achievements. Therefore, taking action to disseminate the use of microcredentials as a tool to support learning and professional activity in a rapidly changing labour market is proposed in the Council Recommendation of 22 June 2022 on a European approach to microcredentials for lifelong learning and employability. The Council notes that one of the conditions for realising the potential of microcredentials is the development and dissemination of standards to make them credible. In particular, arrangements are needed for their design (involving representatives of the communities concerned), description and issuing (based on clearly defined, trusted criteria). The Council points out that it is also important to provide easy access to information about the existing microcredentials offer.

Even before the Council Recommendation on a European approach to microcredentials was published, the Institute of Educational Research (IBE) had started work on Odznaka+ – an application that enables the issuing, collection and sharing of digital certificates (badges) of different types of skills and achievements, especially those obtained outside formal education and with little effort. In April 2021, the first tests of the new tool started. These were aimed at verifying that the basic functionalities of the application work correctly. The experience gathered so far demonstrates the validity of further developing the application itself, as well as looking for opportunities to use it as a tool to support the increasing use of digital microcredentials by:

- a. adults who are, among other things, interested in enriching their portfolio with new skills and achievements,
- b. employers who want to recruit staff quickly and accurately, reduce turnover costs and optimise investment in developing the competencies of those they employ,
- c. education providers (including training companies) who want to increase the attractiveness of their offer by better matching it to the expectations of potential customers.

The usefulness of the microcredentials and an assessment of the relevance of including them in the toolkit to support lifelong learning policies will be verified in the course of work with representatives of the communities concerned (potential issuers, earners and consumers of digital badges).

Pilot activities will be carried out in the first instance using microcredentials on ICT (Information and Communications Technology) skills.

There is a steady increase in the number of job offers for people with ICT skills, both for professionals and for people who want to start their career in this area. Although companies are open to hiring people with ICT skills, they face difficulties at the recruitment stage, such as: too few applications from candidates or insufficient knowledge and skills of candidates. According to a report by the Polish Economic Institute published in November 2022, there is a shortage of around 150,000 IT specialists in Poland.

In the course of the project (after the first phase of pilot testing) another categories of microcredentials will be identified, covering skills other than ICT (according to the needs).

Solutions developed in the course of the project, especially those concerning standards for describing or ensuring the credibility of microcredentials, if their usefulness is assessed positively, will be able to be incorporated into practice in the future – disseminated and used in other sectors of the economy.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

Not applicable in the context of the project 'Microcredentials – piloting a new solution to support lifelong learning' due to the fact that it started in October 2023.

With regard to the Odznaka+ application, it originated in the Integrated Qualifications System project and is being developed in the project 'Microcredentials – piloting a new solution to support lifelong learning'. It is attracting a lot of interest, especially after the release of the Recommendation of the Council of the European Union of 22 June 2022 on a European approach to microcredentials for lifelong learning and employability. From the experience so far, there is a need for a quality assurance system for the Odznaka+ application.

TARGET AUDIENCE	ADDRESSED TO
In line with the Council Recommendation of 22.06.2022 on a European approach to microcredentials for lifelong learning and employability, it is worthwhile for Member States to create conditions that are conducive to the use of microcredentials in formal, non-formal and informal learning environments. This is why the project foresees that the work on microcredentials (their standards, verification of usability, establishment of recommendations for their dissemination) will involve: • Institutions of formal education, especially universities, which address their offer in the form of non-formal education and informal learning to adults preparing to enter the labour market or wishing to acquire skills to retain or change jobs, • institutions outside formal education that support adult learning, in particular: • employers, looking for employees with specific skills (and not always able to accurately identify/verify them) and wanting to increase the effectiveness of their investment in the competences of those they employ, • training companies (interested in developing an adult education offer, often in response to the needs of a particular business), • recruitment agencies (who identify the competences of the workforce and assess their match with employers' requirements), • sectoral organisations and sectoral competence councils (involved in forecasting skills needs, designing solutions for skills development and recruitment),	VET (in general)

- employees for whom - according to the survey - a frequent barrier to learning and acquiring skills is unwillingness/declared lack of needs, inability to reconcile work, family responsibilities and learning, as well as lack of requirements or incentives from employers, - young people entering the labour market, e.g. final-year learners, trainees, who want to clearly and reliably document their preparation for the tasks of the job.		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable): ITCT	
NUMBER OF CURRENT AND POTENTIAL USERS			
Current users of application: 10 277 Potential users of application: unlimited		OTHERS (Youth exploring/transitioning to the labour market)	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	not applicable	01.10.2023-30.09.2026	Pilot/temporal
Mixed			
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			Ongoing
ESF+ budget: 5 266 000 €			
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?			
Yes, it is informed by research.		If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used: The assumptions and the first version (MVP) of the application were developed under the project 'Supporting the development of the integrated qualifications system, particularly at the regional level, through the implementation of solutions and initiatives addressed to the system's end users.' The Odznaka+ pilot attracted a lot of interest from representatives of different communities (e.g. employers, universities, training companies, industry associations, foundations). The Odznaka+ application won the Polish Intelligent Development Award in the category Brand of the Future in 2022.	
Yes, it builds in previous experiences.			
Yes, it is informed by both (data and previous experiences on skills intelligence).			
No.			

DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable).
Please specify if the initiative/policy uses any type of emerging technology.

Poland has created a system that organises and simplifies the processes of issuing, collecting and sharing digital credentials. The Odznaka+ application was developed at the Educational Research Institute as part of the project for supporting the development of the integrated qualifications system.

The application now is based on Open Badges 2.1 standard. In the fourth quarter of 2024, we plan to start analytical work on the implementation of the Open Badges 3.0 standard and possibly the European EDC standard. Both standards are based on Verified Credentials standard (VC).

The Odznaka+ application is available to individual users, i.e., badge earners – those who want to certify their skills and competences and meet the specific criteria for obtaining a given digital badge – and to representatives of organisations (e.g., companies or universities) – badge issuers. Access to the badges – if their holder makes them available – will also be viewed by ‘recipients’, people who do not have an account in the system but are interested in what a given person had to do to confirm a given skill.

The Badge+ application is based on the international open badges standard, which guarantees its high technological quality and security. However, Polish specialists also incorporated several innovations in the app, such as the possibility of creating digital portfolios in the system, which can replace traditional CVs.

The Odznaka+ app is available via a web browser for all users, and also in the form of a mobile app aimed at individual users (badge holders). The main functionalities of the application are:

- a. the creation of different types of microcredentials in the form of badge classes containing the data necessary to identify a given achievement and the criteria that an individual user has to fulfil in order to receive a badge,
- b. the issuing of Open Badges by stakeholders (Issuers) as an attestation of a given skill, achievement or qualification, with the possibility of attaching evidence of the criteria for obtaining the attestation,
- c. verification by external audiences of the digital badges made available to them,
- d. visualisation of skills development paths by issuers, making it easier for individual users to accumulate achievements in stages, e.g. to obtain qualifications,
- e. accumulation of badges by users, who thus build their digital portfolio and can share it with various external audiences e.g. in recruitment processes,
- f. integration with social media, making it easier for users to share their achievements.

EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)

- Ongoing monitoring of the level of achievement of indicators.
- Development of standards for designing, describing, issuing and ensuring the reliability of microcredentials.
- Number of microcredentials described in the project.
- Number of dissemination campaigns carried out on the dissemination of microcredentials in the lifelong learning process of adults.
- Number of institutions or companies or organisations that have tested a system of microcredentials.
- Conducting a usability study of the microcredentials among the users of the pilot.
- Development of an evaluation of the usability of the solution by the users (based on the results of the pilot).
- Developing recommendations for the integration of microcredentials into practice and policy as a solution to support lifelong learning.

PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT

The project is receiving a great deal of interest and a positive response from public and private bodies and universities. We are working on both creating a standard for microcredentials and providing a digital tool for issuing them (the Odznaka+ app). The project supports stakeholders in describing microcredentials and provides a free app for issuers and users.

PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE	
https://odznakaplus.ibe.edu.pl/ https://www.CEDEFOP.europa.eu/en/news/poland-badge-testing-new-tool-digital-badges https://depot.ceon.pl/bitstream/handle/123456789/19698/2021_Nowakowski%2cStechly_Przysz%2c5%82o%2c5%9b%2c4%87%20edukacji%20i%20nowe%20formy%20po%2c5%9bwiadczania%20umiej%2c4%99tno%2c5%9bci.pdf?sequence=4&isAllowed=y https://www.gov.pl/web/nauka/wytyczne-w-zakresie-stosowania-mikroposwiadczen-w-instytucjach-szkolnictwa-wyzszego-i-nauki https://ekspertcivet.org.pl/brepo/panel_repo_files/2022/06/24/pffvnu/evet-microcredentials-jbrdulak-jle-wicki-3-pl.pdf	
TAGS (initial proposal)	
micro-credentials, badges, ICT skills, microcredentials, mikropoświadczenia #FunduszeUE #FunduszeEuropejskie , microdegrees, lifelong learning, Odznaka+, microcredentials polska, microcredentials poland	
CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	✓
2. Digital skills for VET teachers/trainers	
3. Digital skills for learners	
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	✓
6. Flexible accreditation mechanisms	✓
7. Incorporation of emerging technologies (related to industry 4.0)	✓
8. Digital technologies in career education and guidance	✓
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	✓
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	✓
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.16

Learning factories in VET institutions (Fagskolen Innlandet case).

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
Fagskolen Innlandet- MTCN	Gjøvik/ Norway
NAME OF THE INITIATIVE/POLICY	
Fagskolen Innlandet- Learning Factory	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://www.fagskolen-innlandet.no/	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO

MAIN GOAL OF THE INITIATIVE/POLICY

The initiative aims to allow VET learners to use last technological developments during their learning. It aims to prepare learners for Industry 4.0 and its technologies (e.g digital technologies, Artificial intelligence) in a practical way.

DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR

The main contributions of the initiative are.

- Facilitate the access to an authentic and modern production environment that is shaped by industry 4.0 technologies (digital technologies, Artificial intelligence) for learning.
- Connecting the VET school with the local industry and its skills needs.

MAIN CHALLENGES ADDRESSED BY THE INITIATIVE

- Lack of Real and modern equipment and environments in VET institutions.
- Lack of updated skills for industry 4.0 from VET learners
- Lack of connections and collaborations between VET and industry

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

A learning factory is can be defined as ‘ a learning environment specified by: a) processes that are authentic, include multiple stations, and comprise technical as well as organizational aspects, b) a setting that is changeable resembles a real value chain, c) a physical product being manufactured, and d) a didactical concept that comprises formal, informal and non-formal learning, enabled by own actions of the trainees in an on-site learning approach’ (Abele, 2016 [link](#))

Following the Learning Factories concept, Fagskolen Innlandet works together with the local industry in learning factories equipped with modern technology to perform practical training activities in spaces that resembles real environments in a controlled way and where digital technology related with industry 4.0 is available and used. These spaces are in a local Industrial Park (Raufoss). The learning factories allow to implement ‘cases’ and be adapted to concrete situations or experiences needed to improve learning. This collaboration is only possible forging alliances between industry and education sector. In the case of Fagskolen Innlandet, they collaborate with the Manufacturing Technology Norwegian Catapult Centre (MTNC) that collaborated in the development of the learning spaces.

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

The rationale behind this initiative was the need from VET school to have access to better learning environments that include state-of-the-art digital technologies and from industries to have future workers with the adequate skills for their production procedures.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

- It is key to build partnership between industry and VET education institutions to improve quality of education. In the Fagskolen Innlandet case collaboration with the NMTNC was a key success factor.
- This model is useful for VET institutions for developing a more practical training including digital technologies, but also for industry as they equip future workers with skills demanded by industry 4.0 and can test new production methods in the learning factories.
- This model is economically efficient as benefits to VET institutions and industry and costs does not fall on a single institution. Even, can be financed only by industry as shows the Fagskolen Innlandet case.
- This model allows align the theory and curricula to real local practices and needs.
- The model can be transferable to other contexts, but there is a need of existence of modern industry and access to funding.
- Learning factories could also address teacher training needs.

TARGET AUDIENCE		ADDRESSED TO	
VET Learners, Companies and Industry, VET institutions.		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable) - ICT	
NA		OTHERS (Youth exploring/transitioning to the labour market)	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	Fagskolen Innlandet Manufacturing Technology Norwegian Catapult Centre (MTNC)	Started in 2019	Pilot/temporal
Mixed			Ongoing
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			
ERASMUS-EDU-2022-CB-VET			
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?			
Yes, it is informed by research.		If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used: It follows the learning factories model, but adapts it to the needs of industry 4.0 and its technologies.	
Yes, it builds in previous experiences.			
Yes, it is informed by both (data and previous experiences on skills intelligence).			
No.			
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.			
• Modern production equipment • Robots • Digital technologies and Artificial intelligence			
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)			
NA			
PLEASE ADD HERE ANY THOUGHT OR REFLECTION REGARDING THE INITIATIVE THAT YOU CONSIDER RELEVANT			
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE			
https://mtnc.no/ https://unevoc.unesco.org/pub/digitalization_fagskolen_innlandet_the_learning_factory1.pdf			
TAGS (initial proposal)			
Learning factor, VET provider-employer collaboration, industry 4.0, partnerships.			

CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	
2. Digital skills for VET teachers/trainers	
3. Digital skills for learners	✓
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	✓
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	✓
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.17

SELFIE & SELFIE WBL

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
European Commission Joint Research Centre	Europe
NAME OF THE INITIATIVE/POLICY	
SELFIE and SELFIE Work-Based Learning	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
Digital transformation of education (europa.eu) https://education.ec.europa.eu/selfie https://schools-go-digital.jrc.ec.europa.eu/ https://education.ec.europa.eu/selfie/selfie-for-work-based-learning	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
The SELFIE initiative aims to guide and promote collective reflection, debate, and planning on digitalization of schools. To make it more efficient it also aims to offer data on weaknesses and strengths regarding different digital capacity areas for educational organisations. SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational technologies) is a free tool designed to help schools embed digital technologies into teaching, learning and assessment. The SELFIE WBL module focus on helping VET institutions and associated companies (in work-based learning practices) making informed decisions on their digital transformation of education by reflecting how digital technologies are used for teaching, learning (including WBL) and assessment. SELFIE WBL (for work-based learning) is a module, an extension of SELFIE to the specific requirements of dual vocational education and training, in other words, work-based learning environment (learning also takes place at the workplace)	

DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR

The initiative offers a self-reflection tool (scientifically validated, tested and piloted in several EU and non-EU countries) covering different areas of digital capacity of schools. It contains questions for school leaders, teachers, learners, and in-company trainers (when work-based learning is offered). At the end of the self-reflection process the tool offers a school report with the aggregated information of the responses that gives and overview of elements and areas where technologies are more and less developed in the school. It should be used for identification of needs and planning. SELFIE and SELFIE WBL are considered as a diagnosis tool in relation to the level or use and integration of digital technologies in the educational process.

SELFIE and SELFIE WBL were originally based in the European Framework for Digitally Competent Educational Organisations ([DigCompOrg](https://digcomporg.eu/)).

MAIN CHALLENGES ADDRESSED BY THE INITIATIVE

The project was designed after detecting that schools need help for strategically thinking on their digital transformation. In concrete it was detected a lack of:

- Common language about what digital capacity means
- Strategic planning
- Guidance,
- Data for digital transformation

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

SELFIE offers a free online self-reflection tool, available in 41 languages (including all official EU languages), that promotes reflection and generates data about the state of digitalisation of the school. It includes questions covering the following areas: Leadership, Collaboration and Networking, Infrastructure and Equipment, Continuous Professional Development, Pedagogy: supports and resources, Pedagogy: implementation in the classroom, Assessment Practices and Student Digital Competence.

The SELFIE WBL module is a specific module, focused on support Dual VET, that can be activated in the SELFIE tool and includes questions about digitalization of the training delivered by companies to VET learners taking place at the workplace, within the training program agreed with the VET institution.

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

SELFIE tool was created to support schools in the process of digital transformation, by reflecting about their current use of digital technologies in the educational process and fostering an internal collective discussion on how to move forward in this process. Another relevant problem was to address the lack of strategic thinking and data when developing digitalization plans by schools (including VET ones). Moreover, the module SELFIE-WBL responds to the need to include in-company trainers in the reflection on the digitalisation of VET institutions that implement this model of training.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

- It has been highly accepted by users and schools, making clear that data and guidance for digital transformation is a need.
- Collective self-reflection is a powerful instrument to involve the whole community and to take informed decisions based on real data.
- It has been more used in some countries than others, therefore it highlights that there is a need of pan-European tools promoting digitalisation.
- The possibility of flexibility and personalization has been a success and highly used by schools.
- When data is integrated in public policies schools that are more advanced in terms of digitalisation tend to use it more. Integration has to be carefully planned to target those schools that need it more.
- Data can be used to monitor policies at national level.
- Translation is a key factor to facilitate its adoption, although it is a challenge itself to have the tool in many languages.

TARGET AUDIENCE		ADDRESSED TO	
(VET) institutions (in this case, although SELFIE covers all educational levels under university)		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS			
SELFIE= Around 40,000 schools and 6,000,000 users		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable)	
SELFIE WBL= Around 200 VET institution and 45,000 users		OTHERS (Youth exploring/transitioning to the labour market)	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	Fagskolen Innlandet Manufacturing Technology Norwegian Catapult Centre (MTNC)	SELFIE started in 2018 and SELFIE WBL in 2021	Pilot/temporal
Mixed			
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			Ongoing
ERASMUS-EDU-2022-CB-VET			
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?			
Yes, it is informed by research.		If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used: The self-reflection tool is based in the DIgCOmpOrg model and has been validated using a variety of processes: psychometric analysis of the items, qualitative research, user-consultation among others	
Yes, it builds in previous experiences.			
Yes, it is informed by both (data and previous experiences on skills intelligence).			
No.			
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.			
Online tool and dashboard that allows the implementation of self-reflection exercise by schools and database that allow the generation of school reports.			
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)			
The tool has been validated and used by a high number of schools and users. It has been published a policy brief on the qualitative evaluation of the tool: https://publications.jrc.ec.europa.eu/repository/handle/JRC135407 . The main conclusion are: a) SELFIE works as a diagnostic tool, c) is easy to use, d) the tool foster better changes when used involving the whole school community and is aligned with digital policies, e) self-reflection alone is not enough to promote changes, there is need of broader integration in a plan for digital transformation and follow-up actions and supporting training, materials can help, f) The tool can and needs to be adapted to local and specific needs (e.g. VET sector) Thinking on the last point, it has been also developed and integrated in several EU projects aiming to foster digitalisation of Education (e.g. the SELFIE WBL follow up project https://selfiewbl.tools/ aims to develop sector-specific elements for SELFIE WBL). Its approach has been also developed in other projects (see some of the projects included in this deliverable)			

OPEN COMMENTS. Please add here any thought or reflection regarding the initiative that you consider relevant.	
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE	
TAGS (initial proposal)	
CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	✓
2. Digital skills for VET teachers/trainers	✓
3. Digital skills for learners	✓
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	✓
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	✓
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	✓

ANNEX 1.18

VET teachers embracing digital disruption (VET-TEDD).

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
City of Glasgow College	Europe (6 countries)
NAME OF THE INITIATIVE/POLICY	
VET teachers embracing digital disruption (VET-TEDD)	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
https://www.vet-tedd.eu/en/	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
The project aims to support the continuous professional development of VET teachers across the EU. This project aims to upskill, build capacity, and develop future solutions around Digital learning tools by providing a skills pathway and resource library that will enable and increase access to learning and improve VET delivery through the adoption of technologies that are disrupting VET education.	

DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
One-stop web with free and accessible resources for enhancing the digital competence and digital education practices of VET teachers in Europe. It includes a self-assessment tool on the competences for digital education, microlearning programmes for enhancing them, and good practices bank to learn from others. It provides a skills pathway for continuous development.	
MAIN CHALLENGES ADDRESSED BY THE INITIATIVE	
The project main challenge is the lack of VET teachers' capacities to use digital technologies. It aims to strength continuing education and methodical support for teachers. By addressing this challenge, the project aims to: • Enhance the learning experience of learners. • Foster the differentiation of teaching methods according to learners' learning needs. • Improve the adaptation of young people's skills to labour market needs	
BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE	
This project developed 3 main outputs that are available online for VET education providers and teachers: • A competency framework for engaging digital disruption and a related self-assessment tool on the key competences required by teachers and tutors to maximise the use of digital tools: https://www.vet-tedd.eu/en/self-assessment-tool/. It can help to identify training needs and compare own competences with those of other teachers using the tool. It provides a tailored report to participants. • Six blended learning micro learning programmes for teachers covering the following topics: on: Digital identity, Security and data handling, Alternative environments, Digital education methodologies, Digital education models, and Media rich content (see https://www.vet-tedd.eu/en/micro-learning-programmes/) • Best practice case studies bank aimed to upskill VET teachers in using digital technologies in learning https://www.vet-tedd.eu/en/case-studies/ by fostering peer learning and knowledge exchange.	
RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)	
The project was launched to respond to a lack of VET teachers' digital competence and digital education practices in Europe and respond to the digital transformation needs of the sector.	
LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)	
The Project highlights the value of specific guide and promote reflection on digital practices. It highlights the adequacy and need of combining approaches for digital competence and digital practices development: self-reflection, training courses and peer learning to respond to the training needs.	
TARGET AUDIENCE	ADDRESSED TO
(VET) institutions (in this case, although SELFIE covers all educational levels under university)	VET (in general)
NUMBER OF CURRENT AND POTENTIAL USERS	
NA	SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable)
	OTHERS (Youth exploring/transitioning to the labour market)

FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS				
100% public sector	City of Glasgow College (Scotland). European Institute for Innovation – Technology – Elfi-Tech (Germany). TKNKA (the Basque Country, Spain) Solski Center Nova Gorica (Slovenia), Noorderpoort (the Netherlands), SPEV (Czech Republic) ROC A12 – Astrum College (the Netherlands).	1/09/2018-31/05/2021	Pilot/temporal				
Mixed							
100% private (including companies, NGOs., foundations, etc.)			Ongoing				
Please describe the funding more in depth (source, budget...) Erasmus + Programme of the European Union. Key action Cooperation for innovation and the exchange of good practices. Action Type: Strategic Partnerships for vocational education and training EU Grant: 232.221,91€ + Private funding (NA)			Completed				
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?							
Yes, it is informed by research.	If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used: In one of its outputs it follows the line of successful self-assessment tools previous experiences aimed to the digitalisation of education (SELFIE, SELFIE4Teachers...) and validated empirically. It also, takes into account lessons learned from them to create an environment that complements this tool.						
Yes, it builds in previous experiences.							
Yes, it is informed by both (data and previous experiences on skills intelligence).							
No.							
DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.							
- Online courses - Online self-assessment tool with automatic personalized report							
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)							
It has been signaled as a good Practice in the Erasmus Plus web page.							
OPEN COMMENTS. Please add here any thought or reflection regarding the initiative that you consider relevant.							
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE							
TAGS (initial proposal)							
Teachers' digital competence, teaching methods, continuous professional development, online learning, self-assessment tool, good practices.							

CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	
2. Digital skills for VET teachers/trainers	✓
3. Digital skills for learners	
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	✓
6. Flexible accreditation mechanisms	
7. Incorporation of emerging technologies (related to industry 4.0)	
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	
12. Changes of the roles of practitioners/educators/counselors due to ICT	✓
13. Digital resources	✓

ANNEX 1.19

GROOVE project- Digital transformation of the VET sector.

INSTITUTION/BODY/ENTITY IN CHARGE OF THE INITIATIVE	AREA/REGION/COUNTRY
CARDET	Cyprus
NAME OF THE INITIATIVE/POLICY	
Digital Transformation of the VET Sector	
OFFICIAL LINK OF THE INITIATIVE/POLICY	
www.grooveproject.eu	
CONTACT POINT	
INFORMATION VALIDATED BY THE RESPONSIBLE OF THE INITIATIVE	
YES	NO
MAIN GOAL OF THE INITIATIVE/POLICY	
The GROOVE project aims at building the capacity of VET providers/trainers to digitize, modernize their practices and build VET learners' digital literacy.	
DESCRIBE THE MAIN CONTRIBUTION OF THE INITIATIVE/POLICY TO SUPPORT THE DIGITAL TRANSFORMATION OF THE VET SECTOR	
The GROOVE Project supported the digital transformation of the VET sector through: - Improving VET providers'/trainers' competences to prepare and implement a digital education action plan. - Building VET teachers'/trainers' capacity to modernize their teaching practices through pedagogically-driven digital technologies, online education and support remote teaching. - Building the competencies of VET learners to be digitally competent in the modern era. - Developing innovative quality resources for VET providers, teachers/trainers and learners. - Promoting awareness on the importance of digital literacy for low-skilled adults in Europe.	

MAIN CHALLENGES ADDRESSED BY THE INITIATIVE

The GROOVE project addressed the challenge of the VET sector to modernize education systems to empower educators to prepare digitally responsible and competent learners. This need had become even more urgent since education was deeply affected by the COVID-19 pandemic, while at the same time, digital skills development has been identified as key to promote innovations in the education sector and essential for citizens to navigate in the modern world.

BRIEF DESCRIPTION OF THE MAIN ASPECTS AND ELEMENTS OF THE POLICY/INITIATIVE

The main elements of the project include:

- Toolkit for developing a digital strategy in VET: The GROOVE Toolkit refers to the development of an attractive support package to allow VET providers to reflect on and enhance their digital readiness, being equipped with strategies of improving trainers/trainers' and learners' digital skills.
- Digital transformation intelligent tutor and online learning space: The GROOVE digital transformation intelligent tutor will be an interactive guide for developing a digital action plan integrated into an online learning platform with digital resources, OERs, and tools for transforming the VET sector.
- Digital transformation training programme for VET providers / trainers: This training will build VET providers'/trainers' capacities in designing holistic educational programmes that foster learners' digital skills.

RATIONALE AND NEED – WHY WAS THE POLICY/INITIATIVE LAUNCHED? (If possible, describe the process from the very beginning to the development of the initiative: What are the needs? WHAT are the foundations that underpin it? Was there a diagnosis/identification of needs phase? Does it have pedagogical, technical or policy approaches behind it? Monitoring of the impact? Expected results? Next steps?)

VET is an integral part of education providing lifelong learning systems equipping individuals with skills responding to the needs of the economy but also with skills important for personal development and active citizenship. The European Commission emphasized the need of VET to become more fit to the digital age since VET will play a crucial role in helping people to find jobs after the Coronavirus crisis, while the European Skills agenda that highlights that 70% of 16- to 74-year-olds should have at least basic digital skills by 2025 (COM, 2020). Teachers and trainers are crucial actors in ensuring the quality of VET and need to be supported and empowered to shape flexible responses to emerging needs and to the need to develop digital skills. The GROOVE project addressed the growing gap between the demand for, and supply of, a digitally competent workforce through adjusting the VET sector to become more resilient to rapid technological and labour market changes. The project focused on building the capacity of VET providers/trainers to digitize, modernize their practices and build the low-skilled adults' digital literacy skills.

During the initial phases of the project, the partnership conducted an analysis through focus groups and questionnaires to identify the training needs of VET providers/trainers. The results indicated that:

- There is a growing need for the creation of national policy frameworks for the development and integration of digital competences.
- Information and Data Literacy and Safety skills were considered more important than Digital Content Creation and Problem Solving skills for VET professionals.
- About half of VET trainers responded that they were not aware of the DigComp2.1 and DigCompEdu frameworks.
- More than half reported that they use digital technologies to support teaching; however, fewer stated that they have the capacity to further modernize their teaching practices to promote learners' digital literacy.
- A transversal module on digital skills is suggested to be integrated into VET programs for both VET trainers and learners.
- Training should focus on using digital tools within lifelike situations and practical interactive activities.
- Ensure access to technology, quality, and up-to-date digital tools, and provide training on how to use them.
- Raise awareness about people with inadequate access to digital equipment and educational content adjusted to their needs, regardless of their social reality or location.

LESSONS LEARNT: PLEASE DESCRIBE THE ELEMENTS OF THE POLICY/INITIATIVE YOU THINK CONTRIBUTED TO ITS SUCCESS AND THOSE THAT YOU THINK CAN BE IMPROVED IN THE FUTURE. (Enablers, challenges faced, and solutions applied)

Enablers for success

- The use of the Digital Competency Frameworks (i.e., DigComp2.1 for citizens, DigCompEdu for educators, and DigCompOrg for organizations) helped in framing the content of the project material and learning outcomes during the trainings.
- The blended learning approach followed provided flexibility to the participants, while the e-learning training material allowed self-paced and autonomous learning.
- The digital transformation framework suggested in the project guided the activities and production of learning material.

Lessons for the future

- Training in digital transformation should be continuous and long-lasting, guided by a counsellor/expert, in order to be more effective and have sustained impact.
- All members of the organization should be involved in the digital transformation process in a systematic and targeted way to align their actions and eventually experience substantial improvements.
- Specific goals for digital transformation should be in place, prioritize the goals, and believe in change through persistent effort.

TARGET AUDIENCE		ADDRESSED TO	
VET providers, organisations, trainers		VET (in general)	
NUMBER OF CURRENT AND POTENTIAL USERS			
1000		SPECIFIC SECTOR/ PROFESSIONAL BRANCH (if applicable)	
		OTHERS (Youth exploring/transitioning to the labour market)	
FUNDING	PARTNERS (if applicable)	TIMING FOR THE INITIATIVE (start date, expected duration and calendar)	STATUS
100% public sector	CARDET (Cyprus) INNOVADE (Cyprus) EUROTRAINING (Greece) STP EUROPA (Spain) INNOVA+ (Portugal) FUTURE IN PERSPECTIVE (Ireland)	01/01/2021 – 31/12/2023	Pilot/temporal
Mixed			Ongoing
100% private (including companies, NGOs., foundations, etc.)			
Please describe the funding more in depth (source, budget...)			
EU Grant: Erasmus+ Project Number: 2021-1-CY01-KA220-VET-000033254			
IS IT INFORMED BY PREVIOUS RESEARCH OR PREVIOUS EXPERIENCES?			
Yes, it is informed by research.		If it is informed by any of the above, please mention the previous research or work on the topic used to develop the initiative and describe how it was used:	
Yes, it builds in previous experiences.			
Yes, it is informed by both (data and previous experiences on skills intelligence).			
No.			

DESCRIBE THE TECHNOLOGY USED, HOW IT IS USED AND FOR WHAT PURPOSES (If applicable). Please specify if the initiative/policy uses any type of emerging technology.	
The e-learning platform includes an online course (modules) and an 'intelligent tutor' system that provides personalised recommendations based on users' self-assessment on the digital status of their VET organisation	
EVALUATION RESULTS/MONITORING PLAN (If applicable, please describe the process and the main outcomes)	
n/a	
OPEN COMMENTS. Please add here any thought or reflection regarding the initiative that you consider relevant.	
PLEASE SHARE HERE LINK/S TO DOCUMENTS RELATED TO THE PRACTICE	
- e-Learning platform: https://elearning.grooveproject.eu/ - Toolkit for developing a digital strategy in VET: https://grooveproject.eu/wp-content/uploads/toolkit/index.html - Digital transformation training programme for VET providers /trainers: https://grooveproject.eu/wp-content/uploads/2024/01/GROOVE_R3_Digital-Transformation-Training-Programme_EN.pdf	
TAGS (initial proposal)	
Teachers' digital competence, teaching methods, continuous professional development, online learning, self-assessment tool, good practices.	
CHECKLIST FROM LITERATURE REVIEW	
1. Development/use of information systems	
2. Digital skills for VET teachers/trainers	✓
3. Digital skills for learners	✓
4. Development of socioemotional & transversal skills	
5. Transformative potential of blended and online learning	✓
6. Flexible accreditation mechanisms	✓
7. Incorporation of emerging technologies (related to industry 4.0)	
8. Digital technologies in career education and guidance	
9. Promotion and consideration of the link between sustainable human development and technologies use (well-being, workers conditions, environmental sustainability, career education, critical thinking/what for? -related to industry 5.0)	
10. Tackling technology-related gender gaps in VET	
11. Ecological & strategic approach in VET (cross ministerial, stakeholder collaborations, partnerships between VET providers-employers)	
12. Changes of the roles of practitioners/educators/counselors due to ICT	
13. Digital resources	

Annex 2: Why are the digitalisation of VET initiatives designed for? Summary of goals & rationales

Below, we describe a summary the main goals and rationales for them found during the analysis of the initiatives selected in the report. Many initiatives have co-existing goals as these are not mutually exclusive. It is important to note that we do not have a representative sample of initiatives. It means that the information presented here simply aims to give an overview of frequent goals signalled but the analysed initiatives but cannot be understood as exhaustive or quantitatively representative of the EU reality.



One of the most important goals of the analysed initiatives is this related to skills development of VET learners (see initiatives 6.12, 6.13, 6.14. This includes development of general digital competence, but also specific technical skills such as these needed for integrating AI and for working in industry 4.0 (see initiatives 6.6, 6.12, 6.13, 6.16). Moreover, although it is much less common, some initiatives also focus on the development of soft skills alongside digital skills (e.g. problem solving, creativity, critical thinking, etc.). Employability in a changing world and a digital economy is the main driver for this category of goals. However, some initiatives also point the need of building a human-centered relationship with technology (see initiatives 6.1, 6.13).

The modernisation of VET education system is another important goal signalled by several initiatives (see initiatives 6.4, 6.6, 6.6, 6.8). It includes updating curricula to state-of-the-art technology and demands of employers and industry, modernise teaching methods benefiting from emerging technologies (e.g. virtual and augmented reality), and infrastructures, providing modern equipment and facilities for practical training (e.g. fablabs). Some initiatives foster the self-reflection of VET institutions to detect how to better change and modernise the institution to improve its quality (see initiative 6.17). There are also initiatives developing learning resources that can be used by learners (and teachers). Finally, some initiatives focusing on new ways of recognising skills using digital badges aim to solve the problem of recognition of skills that are acquired in flexible and modular ways, often out of the formal education system and during one's career (see initiative 6.11, 6.16). The main rationale behind this goal is that VET systems need to adapt to the rapid social and technological changes in the society and labour market. Some initiatives also point the need for research and innovation in the sector and becoming leaders in strategic sectors such as AI (see initiative 6.3, 6.6, 6.12, 6.13).

A third important goal declared by the initiatives is professional development of VET professionals. They aim to develop their skills to use digital tools and transform pedagogies effectively by using

the ICT potential. For this, there are several approaches, some initiatives encourage collaboration and knowledge sharing among teachers (see initiative 6.13), others self-reflection for later development of skills (see initiative 6.12, 6.18), others simply offer learning resources (see initiative 6.14), learning scenarios (see initiative 6.4), open training courses or MOOCs on specific topics (see initiative 6.2). The rationale behind this goal is upskilling and reskilling VET teachers. Initiatives that connect with the pandemic, signal the need for addressing educational disruptions and offer online and blended learning (see initiatives 6.2, 6.6, 6.11, 6.19). Other initiatives also point to the need for having teachers able to exploit the full pedagogical potential of digital tools (e.g. fostering active collaboration, real-world challenges, assessing outcomes, continually improving the learning experience) (see initiatives 6.12, 6.13). Next, it is also signalled the need for acquiring expertise in the use of state-of-the-art technologies related to industry 4.0 demands (see initiatives 6.5, 6.12). Finally, it is expected that VET teachers can develop digital competence of learners.

Career guidance and employability are also part of the goals of the initiatives. In this category, we found initiatives that directly deal with career guidance and support (see initiatives 6.9, 6.10) and others that use the potential of digital technologies to provide data and information on skills sought by employers and try to match skills with demand (see initiatives 6.6, 6.7). This last approach can be useful for inform career choices but also for modernising curriculum. The rationale for these goals is multiple. Some initiatives signal the need of better skills intelligence systems in general for curriculum design and education/labour market choices (see initiative 6.7), others focus on counselling and guidance procedures (see initiative 6.9), and finally others put the focus on social justice, acknowledging the need for addressing specific needs of some groups for and better information and guidance. (e.g. low skilled or at risk of exclusion) (see initiatives 6.7, 6.8, 6.11).

Finally, we can find the goals of the initiatives that aim to provide orchestrate digitalisation at regional (see initiative 6.1) or national level (see initiative 6.8), but also those offering guidance and facilitate strategic decisions on digitalisation at VET-school level (see initiative 6.3, 6.13). It includes national and regional policies but also more specific tools or guides such as SELFIE (see initiative 6.17) or the ILO guide (see initiative 6.11). Moreover, one initiative serves as example of how to align aligning VET with the needs of the emerging green sector using digital tools and is presented as an example of twin-transition (see initiative 6.14). The rationale behind these initiatives is, on the one hand, the lack of strategic planning and, on the other hand, the aim of building an ecological, cooperative, strategic, and multi-stakeholder approach to digitalisation of VET.

Regarding the more frequently paired goals in the initiatives we found that learners' skills development goes commonly together with modernisation of VET provision, educators and trainers' development, and career guidance and employability. On the other hand, development of VET professionals tends to go together with modernisation of VET education systems.

Chapter 2.

Emerging technologies and trends in VET

Annex 3: List of Erasmus+ projects and COVE initiatives

Figure A. Long list of Erasmus+ projects against selection criteria

Technology	No. of Projects	Good Practice Projects	Coordinator's Country	Participating Countries	Topic of 'New innovative curricular/educational methods/development of training courses' also indicated
Artificial intelligence	6	None	-	-	-
Virtual reality	5	Didactic innovation labs (DIOS) –digitalisation experts in VET	DE	DE,SI,NL,CZ,CY	Yes
		New skills to face the risks of counterfeiting in consumer goods for children	ES	ES,PT,CZ,FR	No
Augmented reality	6	Didactic innovation labs (DIOS) –digitalisation experts in VET	DE	DE,SI,NL,CZ,CY	Yes
		Fostering industry 4.0 and 3D technologies through social entrepreneurship: an innovative programme for a sustainable future–3D2ACT	EL	EL,IT,ES,NL,CY	Yes
		Safe Earthworks Training with the use of Augmented Reality	PL	PL,DE,ES	Yes
		New skills to face the risks of counterfeiting in consumer goods for children	ES	ES,PT,CZ,FR	No
3D	7	Didactic innovation labs (DIOS) –digitalisation experts in VET	DE	DE,SI,NL,CZ,CY	Yes
		Fostering industry 4.0 and 3D technologies through social entrepreneurship: an innovative programme for a sustainable future–3D2ACT	EL	EL,IT,ES,NL,CY	Yes

		Industry 4.0 in healthcare	PL	PL,MT,LT,ES,RO	Yes
		Art & Creative Craft Enterprises for Successful Streaming of 3D Printing	FR	FR,SK,PT,ES,SI	Yes
		1Point: VET training using the one-point lessons approach	SI	SI,EL,ES,IT,CY	Yes

Figure B. Long list of Centres of Vocational Excellence projects

2019 (2 years' funding) Digital innovation hub for cloud-based services. Lead = FI
2020 (4 years' funding) ALLVIEW – Alliance of Centres of Vocational Excellence in the Furniture and Wood Sector – strong profile given to open-source AI-based software framework for skills assessment, and AR/VR and 3D. Lead = ES
2022 (4 years' funding) CARE about IT – preparing healthcare professionals to use digital tools, including micro-credential development. Lead = NL
2022 (4 years' funding) HABITABLE – brings green and digital together in Habitat sector, strong profile for digital tools inc. XR, online training centre, MOOCs. Lead = ES
2022 (4 years' funding) TEACH4SD – Transforming Education Area and Competency Hub for Sustainable Development – will set up a digital education for sustainable development hub. Lead = DK

Figure C. Final project selection

Erasmus+ projects
Fostering industry 4.0 and 3D technologies through social entrepreneurship: an innovative programme for a sustainable future– 3D2ACT
Industry 4.0 in healthcare
1Point: VET training using the one-point lessons approach
Didactic innovation labs (DIOS) – digitalisation experts in VET
Centres of Vocational Excellence
CARE about IT – preparing healthcare professionals to use digital tools, including micro-credential development.
HABITABLE – brings green and digital together in Habitat sector, strong profile for digital tools inc. XR, online training centre, MOOCs.

Figure D. Topic Guide for First Round of Exchanges with Experts

JRC T1 Project: Emerging New Technologies and Trends in VET: Discussion Topics Much is already known about digital learning in VET, especially in the wake of the Covid-19 pandemic. Thanks to technological advances, the last 10-15 years have seen a major increase in the potential to decouple teaching and learning from time and place and to offer learners new and different experiences, and provide faster, more tailored feedback. At the same time, obstacles and challenges remain and evidence on the actual benefits of digital learning is often elusive. In addition, the most recent digital advances involving learning analytics and artificial intelligence are raising new questions: will the current wave of technologies accelerate existing trends in the coming years, or will they take us in completely new directions? Are the most recent technologies so different that they may bring about changes on a scale and depth we have not seen before, triggering a set of unavoidable shifts in teaching and learning? Or are they subject to the same problems of 'hype' that have surrounded previous waves of innovation and the same implementation issues? To tackle these questions desk research has already been undertaken, and we are now seeking to gather the views of key informants with practical experience in VET on a range of topics as shown below.

KEY TOPICS
A. Taking stock: Where are we now?
1 What is the rationale for introducing technologies like AI, AR, VR, 3D, digital micro-credentials? What benefits – or solutions to challenges – are they intended to bring? What goals are you pursuing with the implementation of these technologies?
2 How does the context of previous digital learning and educational practices affect the adoption of the latest technologies? Do you have any reflections on the path/steps followed to introduce these technologies?
3 How do the success factors and obstacles faced by advanced technologies like AI, AR, VR, 3D and digital micro-credentials compare to previous technologies? Are they the same (but greater/lesser), or are there new ones? Are there any distinct challenges facing VET ? Is VET lagging behind other sectors of education and training, and, if so, in what ways?
B. Foresight: Where might we be going?
4 Do you foresee any of the following changes taking place in VET in the next 3-5 years due to the influence of technologies like AI, AR, VR, 3D and digital micro-credentials? ● Micro level – Making VET more learner-centric; Personalisation of learning; Opening up new opportunities for practical (work-based) learning; New forms of assessment. ● Meso level – More efficient and effective management of learners and teachers; Improving engagement with employers, management of work-based learning (WBL) ● Macro level – Improving matching of supply and demand for VET through big data analytics for skills anticipation, skill taxonomies, online portals for advertising VET; Open educational practices that make resources and courses available at limited or no cost to whoever wishes to use them; Blockchain and new forms of credentialization; Emergence of new relationships between publicly and privately funded VET linked to growth of edtech market.
5 What would need to happen in the VET system to bring about such changes (e.g., policies, support)?

Figure E. Further Issues Explored in Second Round of Exchanges with Experts

Further Exploration Topics
Further Exploration Topic 1: Teachers and learners need skills to use digital technology effectively and appropriately both in educational situations and in (preparation for) specific occupations. Do you have any reflections on how well equipped (a) teachers and (b) learners are for these different areas of technology use? Do they tend to be better equipped in one domain rather than the other? If so, why? Further Exploration Topic 2: Do you have any reflections on the potential for 3D, AR/VR, AI and micro-credentials to become more widely used in the next 3 years: Please type in your reflections here and briefly explain your perspective: ● AR/VR ● 3D ● AI ● Micro-credentials
Taking the temperature
We would like your personal views on how confident you are about various aspects of digitalisation in the coming years in your country. Please indicate below how far you agree or disagree with each of the statements below using this Likert scale: 1= Strongly disagree 2 = Disagree 3 = Neither agree nor disagree 4 = Agree 5 = Strongly agree Also, please add any reflections or explanations you may wish to offer on your answers.

If current contexts remain the same (e.g. digital education policy, funding, teacher education practices etc), I am confident that in the next 3 years in my country, ...	Write in your score and any explanation/reflection you wish to add in this column
Technologies like 3D and AR/VR will become commonplace in VET	
AI will become commonplace in VET	
Micro-credentials will become commonplace in VET	
VET institutions will be sufficiently supported through national/regional policy and practice to fully embrace technological changes	
There will be increasing divergence between the relatively unconstrained digital worlds of learners and their digital experiences in VET institutions	
The latest wave of technologies will increase inequalities between learners	
Teachers and trainers will have the skills they need to keep up to date with technological changes	
There will be widespread and deep changes in VET pedagogies towards more individualised, active and experiential learning due to the use of the current wave of technologies	
All the potential benefits of the latest technologies for learners will be realised	

Further project information

Figure F. Further information on selected projects and participants in the study

Project Title	Project Objectives	Expert Practitioners Involved in Study
Erasmus+ projects		
Didactic innovation labs (DIOS) – digitalisation experts in VET www.sbgdd.de Duration: 2020 - 2023 Coordinator Type: School/Institute/Educational centre – Vocational Training (tertiary level)	The objectives of DIOS were to promote innovative practices with the aim of using new technologies such as AR, VR, 360° videos, IoT (Internet of things) and 3D printing, especially with regard to the acquisition of individual media pedagogical competencies among vocational education personnel in chemistry, IT as well as electrical engineering/mechatronics in DE, CZ, CY, NL and SI. This course- and person-related approach was consistently initiated, supplemented and accompanied by a structural competence development in the educational institutions involved in the creation of testing and enabling spaces within the framework of their own teaching and learning laboratories for didactic innovations (= systematic approaches for the training and further education of educational staff with regard to practical training). It was planned and implemented that these laboratories would serve to create tailor-made content with digital media to promote innovative approaches to teaching and learning with digital media. The focus on educational technologies supported vocational training personnel in the implementation of modernized training regulations. Trainees or learners in the focus professions benefited directly from this.	Head of digitization projects Didactic innovation labs (DIOS)

Fostering industry 4.0 and 3D technologies through social entrepreneurship: an innovative programme for a sustainable future– 3D2ACT https://3d2act.eu Duration: 2020 - 2023 Coordinator Type: Research Institute/ Centre	The 3D2ACT project aims to support VET teachers and students in strengthening their profiles with the acquisition of new skills, the development of targeted material and e-tools, while at the same time it creates opportunities for linking VET schools with the labour market building on synergies and partnerships with established organizations using 3D Printing and Social Entrepreneurship. The project promotes the following key competences: - 3D Design, Modelling & Printing Skills, which appear to be missing from VET curricula and are currently needed in VET job profiles and to enter the labour market. 3D technologies are currently seen as a cornerstone of the industrial shift towards advanced manufacturing, creating opportunities for employment and reallocation of manufacturing production back to Europe - targeted 'wide and deep' digital competences, as purported by the 2018 Digital Action Plan, such as STEAM (Science, Technology, Engineering, Arts and Mathematics) skills based on a cross-curricular approach - Entrepreneurial skills, but with a social impact as they are responding to social challenges/needs and benefit the community, the environment, the culture. Having an entrepreneurial mind-set is a great advantage in today's job market, since it is what makes ideas become a reality.	- Research Director NetMediaLab Mind-Brain R&D, National Center for Scientific Research 'Demokritos' - Research Associate, National Center for Scientific Research 'Demokritos'
Industry 4.0 in healthcare https://sites.google.com/view/hi40/home Duration: 2020 - 2023 Coordinator Type: Higher education institution (tertiary level)	The HI4 project addressed competence gaps by offering a comprehensive training directed at VET trainers belonging to health professions, entrepreneurs, policy makers, NGO's etc. to help them better cope with the Industry 4.0 technologies (AR, VR, AI, 3D Printing & simulation and concepts, apps and devices) whilst transformation of their jobs and services takes place. The main objectives of the HI4.0 project were: 1. To support the improvement of EU healthcare services quality through implementation of Industry 4.0 concepts by providing relevant studies, analyses, guidelines, and open digital educational tools. 2. To support the EU healthcare sector modernization through professional development of healthcare personnel by strengthening the key competences related to IND 4.0 in both initial VET and continuing VET. 3. To support healthcare personnel in keeping up with the technology advancements in their sector by providing a systematic approach to the initial and continuous professional development of VET teachers, trainers and mentors specialized in Industry 4.0 applications in healthcare through an open and innovative blended-learning course.	- International Project Manager at International Cooperation Department in University of Humanities and Economics in Lodz (AHE) - CEO, MECB Ltd. (Technical innovation consultancy bureau) - University Professor in Computer Science at Lodz University of Technology, International Project Expert at University of Humanities and Economic in Lodz

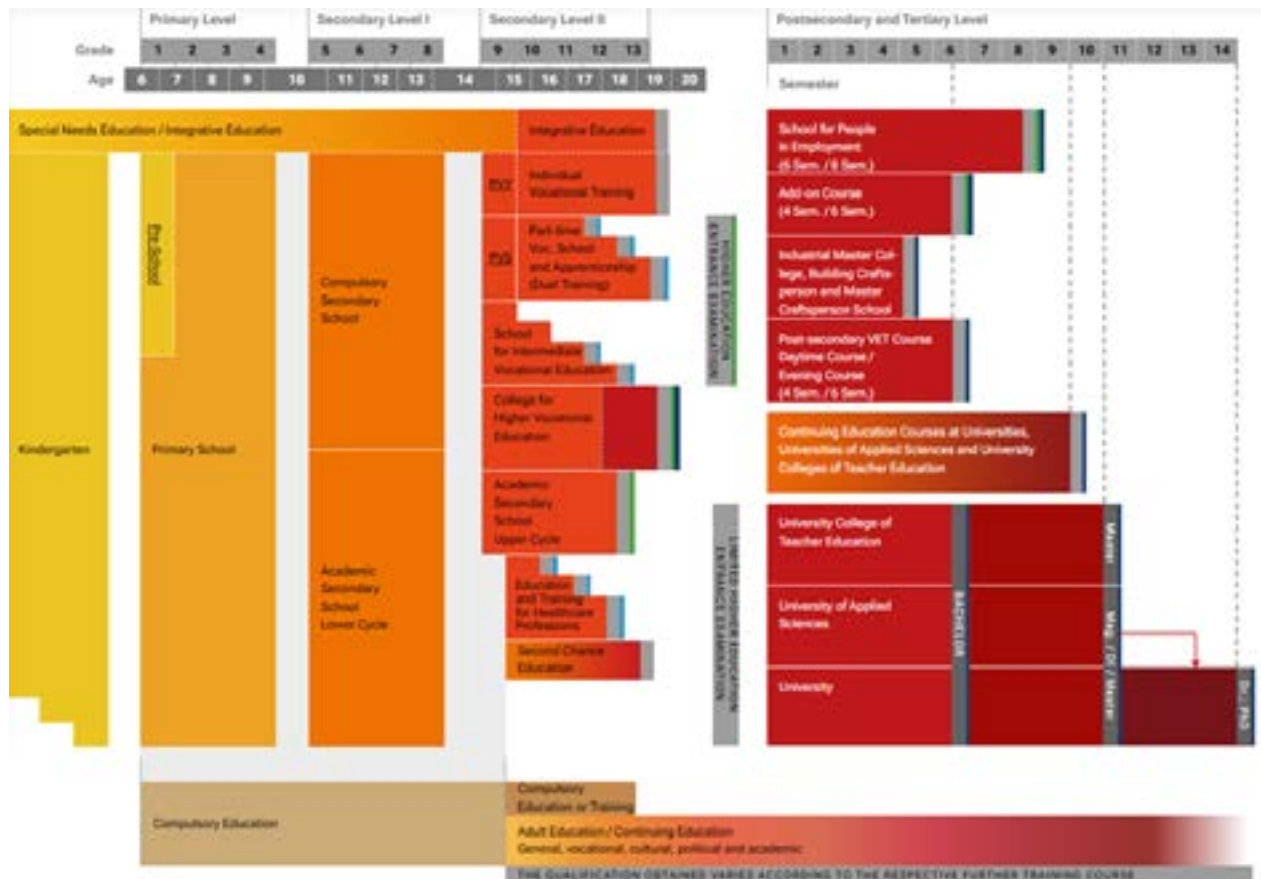
1Point: VET training using the one-point lessons approach https://1pointproject.eu Duration: 2020 - 2023 Coordinator Type: Research Institute/Centre	The 1Point project aims to transform a standard quality assurance method and information security process used in the industry into a creative and innovative training methodology for the VET sector. Our focus was the training of future maintenance professionals to improve IT skills, foster employability and develop innovative thinking. The training course has been designed in accordance with high quality VET standards to meet the labour market needs. The next generation of industry workers should be tech savvy, but VET programs and teaching methodologies have not caught up yet. 1Point promotes a work-based learning approach and the acquisition of concrete knowledge and skills. Therefore, training with the 1Point methodology supports participants to carry out and reflect on tasks that are directly connected to their future workplace (vocational context). The methodology includes the use of modern ICT technologies (3D printing, AR/VR), accessible from different mobile devices (e.g. tablets, laptops) and includes gamification aspects (badges, missions). In this way, the 1Point lesson model creates benefits for VET providers, trainers, learners, and the industry.	- Head of Mechatronics Department, TECOS, Slovenian Tool and Die Development Centre
Centres of Vocational Excellence		
CARE about IT Duration: 2022-2026	The CARE about IT project is designed to reap the benefits of a closer collaboration between technology and the healthcare sectors in Europe. The project aims to provide future and current healthcare professionals with digital skills. In initial as well as continuing Vocational Education and Training, micro-credentials will be created and provide innovative educational programs on both transversal and technical digital skills. National Centres of Vocational Excellence will be set up in the four partner countries which will be linked through a European Platform of Vocational Excellence in HealthTech for knowledge sharing. The main objectives are: • To contribute to the supply of healthcare workers who are in high demand due to current pressing shortages and demographic change. • To prepare healthcare professionals to use digital tools which are increasingly used in the sector. • To support the implementation of promising Health- Tech solutions by providing the skills for lifelong learning for healthcare professionals.	- Practor IT ROC Noorder Poort College - Project Manager of CARE about IT, ROC Noorder Poort College

HABITABLE Duration: 2022-2026	The Alliance of Centres of Excellence in Vocational Training for Sustainable Habitat project aims to respond to the skills shortage and mismatches caused by the digital and green transition in the Habitat sector. To this aim the project will develop innovative, learner-centred teaching methods, curricula on technical skills and key competences, and a system of certification for micro-credentials to up-and reskill adult learners and SME (Small and Medium Enterprises) employees. A Platform of Centres of Vocational Excellence for Sustainable Habitat will be set up building a skills ecosystem together with a wide range of local and regional partners, as well as centres of professional excellence in other countries. Objectives are: • Development of a SMART Skills Intelligence Platform and Monitoring System for the Habitat sector to guide the actions of the skills ecosystem. • Development of a Skills Hub containing the Online Training Centre with a set of training programmes addressed to trainers, SMEs and VET learners, including the elaboration and testing of different MOOCs and courses, and implementation of the Innovative Curricula Digital Database and the MIC - Micro-credentials Certification Centre. • Development of a multifunctional online platform for skills Training, Certification and Career guidance where developed training programmes are available. • Setting up a collaborative platform for CoVEs and SMEs to support work-based learning in the Habitat sector, dedicated to Dual VET and WBL that aims to support SMEs and VET centres to boost quality, digital, green and inclusive Dual VET, apprenticeship and WBL. • Establishment of a Platform of CoVEs for Sustainable Habitat, boosting new projects and initiatives through the Skills Ecosystem Innovation TANK and the co-creation LAB and drafting recommendations for the implementation of a regional and local strategy for upward the convergency of CoVEs.	- Director of Innovation and Internationalisation, AEICE Construcción Eficiente - Project Manager
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Chapter 3.

Case study in Austria

Annex 4: The Austrian education system



Source: <https://www.bildungssystem.at/en/>

Chapter 6.

Case study in Albania

Annex 5: Guiding questions for SELFIE school coordinator and school director (individual interview)

Anonymity and Confidentiality

- Do you agree that offering anonymous feedback encourages honesty and reduces social pressure, making it easier for individuals to openly share their thoughts without fear of retribution? Do you think you would need some kind of identification of the specific respondent to address any specific issue?

Customisation and Variety of Questions

- Is the mixture of topics and closed-ended and open-ended questions fulfilling and complete for you to obtain quantifiable data and allow you to elaborate on or analyse on the responses?
- Does the SELFIE allow you as administrators to tailor questionnaires based on specific courses or programmes or any other characteristic?

Support in Multiple Languages

- Are you satisfied with the option offered in the Albanian language for the tool itself, questionnaires, guidelines, or any support materials such as videos, etc?

Accessibility

- Is the access to questionnaires via links easy and able to be completed on various devices and operating systems?

Ease of Sharing and Timely Delivery

- Are you satisfied with the method of sharing the questionnaires? Does it enable you as an administrator to easily send the questionnaires to colleagues, students or mentors in the business, or to expand the pool of respondents?
- How is the SELFIE tool helping you to send reminders to non-responders to increase response rates?

Data Analysis Capabilities

- Utilise tools that enable efficient analysis of gathered data to inform decision-making processes

Suggestions for improvements

- As an educational institution do you feel that the SELFIE tool allows you to effectively gather meaningful feedback from students, teachers, and other stakeholders to enhance self-reflective practices and promote ongoing improvements in education quality?
- Are there any elements in the design of the online questionnaire that you would like to change?

Recommending SELFIE

- Would you recommend using the SELFIE tool to other schools as well?
- Do you think that the SELFIE tool can have an impact on the improvement of the whole VET sector/provision? If yes, why? If not, why not?

Annex 6: Guiding questions for SELFIE school coordinator and school director (individual interview)

Note: For the focus groups (with leaders, teachers and students) the expert will try to reach a consensus of the participants, while for the individual interviews with the businesses, the expert will take note of the individual answers and then analyse them in an aggregate way, calculate the average in questions where a rating is required, and take note of all comment or suggestions for improvement. To assess the user experience (UX) of the SELFIE online questionnaire, the following questions will be used.

1. Satisfaction: On a scale of 1 to 10, how satisfied were you with the overall experience of taking this questionnaire?

Optional comment:

2. Ease of use: On a scale of 1 to 10, how easy was it for you to navigate through the questionnaire?

Optional comment:

3. Completeness of topics covered: Did you find all necessary topics included in the questionnaire? (Yes/No)

Note: use the specific questionnaire (leadership, teachers, students, or mentors) to remind them of specific questions if needed.

Optional comment:

4. Confidence: Were you confident in providing accurate responses throughout the questionnaire? (Yes/No)

Optional comment:

5. Design clarity: Was the design of the questionnaire clear and intuitive? (Yes/No)

Optional comment:

6. Layout: Would you say the layout of the questionnaire was visually appealing and clear? (Yes/No)

Optional comment:

7. Font legibility: Was the font size and colour easy to read? (Yes/No)

Optional comment:

8. Colour scheme: Do you find the colour scheme of the questionnaire pleasant to the eyes? (Yes/No)

Optional comment:

9. Interface design: Rate the usability of the interface on a scale of 1 to 10.

10. Menu comprehensiveness: Are the menu items clearly labelled and easy to understand? (Yes/No)

Optional comment:

11. Loading speed: Were the load times of the pages reasonable? (Yes/No)

Optional comment:

12. Difficulties encountered: If any, please list the difficulties you faced while navigating the questionnaire.

Comment:

13. Improvement suggestions: Please suggest any improvements you believe would benefit future iterations of the questionnaire.

Optional comment:

14. Recommending SELFIE

(This question is only for focus groups FG with leadership, teachers, and mentors in the business)

- Would you recommend using the SELFIE tool to other schools as well? (Yes/No)
- Do you think that the SELFIE tool can have an impact on the improvement of the whole VET sector/provision? If yes, why? If not, why not?

Comment:

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