European Commission

DIGITALISATION FOR DEVELOPMENT. A TOOLKIT FOR DEVELOPMENT COOPERATION PRACTITIONERS

INTERNATIONAL PARTNERSHIPS (INTPA)

Vocational Education and Training (VET) in the Digital Age

InfoSheet nº9

This InfoSheet is part of a series on digitalisation and relevance to EU International Partnerships and development cooperation programmes. The Toolkit is designed to provide key definitions, main opportunities and challenges for global development presented by digital transformation, case studies and suggested further reading. Learn more on Cap4Dev

What is VET?

"*Vocational education and training (VET) equips people with the knowledge, skills and competences required for particular occupations in the labour market and to thrive in life*"[1]. It helps young people get ready for their first job, and allows adults to learn new skills and develop their careers. **VET plays a key role in the lifelong learning continuum and helps to improve the delivery of relevant and high-quality skills and competences to learners of all ages and at different stages of their careers and lives** (European Commission, 2020a: *VET factsheet.pdf*).

TWO-FOLD IMPACT OF DIGITAL ON VET

Digital transformation of vocational education & training
→ *How to train & learn?*

Digital transformation of work
→ *What to teach?*

Digital technologies for teaching & learning
(e.g. e-learning platforms for continued teaching during the COVID-19 crisis)

Digital technologies for VET system management
(e.g. digital technologies to manage education resources or monitor indicators)

Digital literacy in VET for the whole workforce
(e.g. ability to use social media and an e-mail for client engagement)

Dedicated digital skills VET trajectories for employment in the digital economy
(e.g. specialised technical skills such as software development, digital marketing, etc.)

[1] To ensure a specific scope, the focus of this infosheet is on digital education for skilling and training with a view towards employment or entrepreneurial activities. The impact of the digital age on lifelong learning in the broadest sense or in broader educational practices such as adult education or citizenship education is therefore not covered here although this is an equally crucial issue.

Digitalisation and emerging technologies have an important impact on VET. Firstly, the digital transformation of work and the emergence of new types of employment in the digital economy have **sparked the demand for digital literacy and skills.** Today **it is essential that all professionals are digitally literate or have some level of basic digital skills upon entering employment.** Furthermore, the digital economy has given rise to **new jobs that require intermediate and advanced specialised digital skills. Secondly, digital technologies have revolutionised the way teachers teach, how students learn and the management of the entire VET sector.**

There is a need for innovative responses in teaching, learning and organisation for the effective deployment of digital technologies for skilling, as well as ensuring that VET systems are responsive to the skill demands of the labour market. The COVID-19 pandemic has further increased the demand for digital skills and the need for the VET sector to respond to rapidly changing needs in industry and society.

Digital education and training are an essential part of the Global Gateway strategy[2], which will boost smart, clean and secure links in the digital sector and strengthen education and research systems across the world. Quality education, including digital education, contributes to equitable and inclusive societies and ensures their long-term economic success. The EU will be able to support this by leveraging its experience in promoting VET and life-long learning for evolving economic and social needs. **By supporting sustainable cooperation partnerships between educational organisations and investing in quality skilling for the digital economy, the EU will further support the digital transformation and integration of markets based on European values and standards.**

EU initiatives related to digital literacy and skills and the digital transformation of Technical Vocational Education and Training

The European Commission is actively promoting VET as a tool to enhance the right to education, training and lifelong learning, as part of the Social Rights Action Plan. **The European Pillar of the Social Rights Action Plan aims** at making VET more modern, attractive, flexible and prepared to ensure that the workforce has the appropriate skills for the digital age and the green transition.

This ambition builds further upon the 2020 European Skills Agenda and the Digital Education Action Plan 2021-2027 (European Union, 2020b). The **2020 European Skills Agenda** is a five-year plan to help individuals and businesses develop more and better skills through 12 actions. For example, action 4 highlights the importance of VET to prepare for the digital and green transitions and action 6 sets out the ambition to support digital skills for all in support of both transitions.

Building on the 2020 European Skills agenda, the **Digital Education Action Plan (DEAP) 2021-2027** outlines the European Commission's vision for high-quality, inclusive and accessible digital education in Europe. It outlines two key strategic priorities to this end: 1) fostering the development of a high-performing digital education ecosystem (i.e., in terms of infrastructure, connectivity, digital equipment and capacity, competent teachers, etc.); 2) enhancing both basic and advanced digital skills and competences for the digital transformation.

The Commission's work on VET is further supported by two agencies:

- The European Centre for the Development of Vocational Training (CEDEFOP), which helps to develop European VET policies. It contributes to their implementation underpinned by its research, analyses and information on VET systems, policies and practices, as well as skill needs and demands in the EU.
- The European Training Foundation (ETF) is the EU agency that helps the 29 transition and developing countries[3] harness the potential of their human capital through the reform of education, training and labour market systems, in the context of the EU's external relations policy. It provides policy advice, research and analysis, as well as technical assistance in policy development and implementation increasingly focusing on digital technologies in education and training, and the development of digital skills and competence.

Opportunities and *challenges* of digitalisation for VET in EU partner countries

The digital transformation of teaching and learning

The digital transformation of teaching and learning in VET provides many opportunities to increase access to high quality skilling. E-learning or blended learning has the potential to enhance quality and inclusive education for all by significantly increasing access to training with **limited costs per additional learner**, allowing also for self-paced and personalised learning trajectories. E-learning is usually delivered through online and/or offline Learning Management Systems, which are software applications that function as integrated platforms that can be used to enrol students, manage and deliver educational courses, and at times even perform assessments[4]. More recently, **big data and artificial intelligence** have allowed for significant advances in learner-centred education using computer algorithms to tailor resources and learning activities according to how a learner interacts with the system (Worldbank, 2021a).

The Internet has **transformed access to information for learners**, especially in countries respecting the principles of a Free and Open Internet[5]. The digital age has also facilitated the distribution of high-quality educational materials at almost no additional cost. The **Open Educational Resources (OER) movement** tries to further break down barriers such as copyright restrictions and aims to encourage and enable the free sharing of content (OECD, 2007). OER are digital materials offered freely and openly to educators, students and independent learners to be used and reused for teaching, learning and research. They are generally released with no or limited copyright restrictions (UNESCO, 2009), often through the use of open licenses (e.g., Creative Commons licenses[6]). A guide on how to leverage OER for VET has been developed by UNEVOC (UNESCO-UNEVOC, 2018). **MOOCS, Massive Open Online Courses**, often maintain copyright limitations so the materials cannot be adapted or reused in other contexts and enrolment in these courses is not always free. Nevertheless, these courses often provide (high-quality) online training programmes without formal entry requirements nor participation limits. Finally, the Internet in itself has revolutionised learning through **open access to a wealth of information**.

[2] https://ec.europa.eu/info/strategy/priorities-2019-2024/stronger-europe-world/global-gateway_en
[3] https://www.etf.europa.eu/en/regions-and-countries
[4] Well-known examples are Moodle and Blackboard
[5] https://digital-strategy.ec.europa.eu/en/policies/open-internet
[6] According to the different levels of creative commons licenses, these can grant entirely open access, other attribution required, or some others may not allow modification: https://creativecommons.org/licenses/

OPPORTUNITIES

- E-learning: Limited costs per additional learner
- Learning Management Systems: self-paced & adaptive learning
- Free and open internet: Open access to knowledge, information and learning/ teaching resources
- Emerging technologies

CHALLENGES

- Unequal access to connectivity & devices
- Students' inequality in digital literacy
- Teachers' limited digital skills (technical & pedagogic)
- Lack of interactive and pedagogically sound digital learning materials
- Complexity of hands-on learning & practica through traditional e-learning solutions

The digital transformation of learning provides not only opportunities, but also raises **challenges**. The COVID-19 crisis has demonstrated that VET teachers and training institutions are not always able to revert to distance learning[7]. This can be explained by a number of barriers faced by educators. Firstly, many VET teachers and training institutions do not have access to the **connectivity and devices** required to engage in e-learning. Secondly, **teachers may lack the digital skills** to make effective use of e-learning platforms and/or the pedagogic skills to optimise the digital learning process for their students. In some of the EU partner countries, teachers have been able to **overcome these barriers** during the ongoing COVID-19 crisis by reverting to low-barrier digital technologies, such as social media, messaging and free videoconference services that can be accessed through smartphones, with limited connectivity and moreover require less specialised digital skills.

Virtual reality training in Southern Africa

The Government of Finland, in partnership with the United Nations Industrial Development Organisation (UNIDO), is piloting the use of a virtual reality training app to learn how to properly operate chainsaws in forest industries. In rural areas, reaching a training centre is a difficult task. The project sets up mobile centres in remote areas and gives people the chance to develop their skills. The mobility provided by the app allows more people to be reached. In addition, the training app allows students to learn how to operate a chainsaw before even picking one up, increasing safety in training. This partnership between UNIDO and the Government of Finland is piloted in South Africa and replicated in Malawi, Zambia, and Zimbabwe.

Thirdly, high quality **digital educational resources that are adapted to interactive and engaging e-learning** (instead of pdf versions of regular handbooks), are often not available in local languages or in alignment to local curricula.

In a similar fashion, not all students are able to participate in e-learning, either because of the lack of access to **affordable connectivity and devices**, or because they do not have the **digital skills** to effectively make use of e-learning platforms or to navigate the Internet to access high quality OER. Significant digital divides, such as the rural-urban digital divide (ILO & WB, 2021) and the gender digital divide (ILO, 2021), therefore need to be taken into account to ensure that the digital transformation of teaching and learning is inclusive. Finally, there are **specific characteristics** that complicate e-learning **for VET** (Worldbank, 2021a). VET usually requires **hands-on learning or practical exercises** to support active or work-based learning, which is significantly more difficult to be taught and learned online than theory (EU, 2020; CEDEFOP, 2020). Emerging educational digital technologies, such as virtual labs, augmented and virtual reality, or serious games have demonstrated significant potential to contribute to active learning through (pseudo) real-life simulations and have been specifically relevant for the VET sector (EU, 2020; Worldbank, 2021a; Worldbank blog and study, 2021).

[7] An inter-agency survey on TVET during the COVID-19 crisis showed that in high income countries more than 70% of the respondents indicated reverting to distance learning (online or offline) during the pandemic; less than 20% of the respondents from low-income countries reported the availability of distance learning (online or offline) to continue training (ILO & WB, 2021).

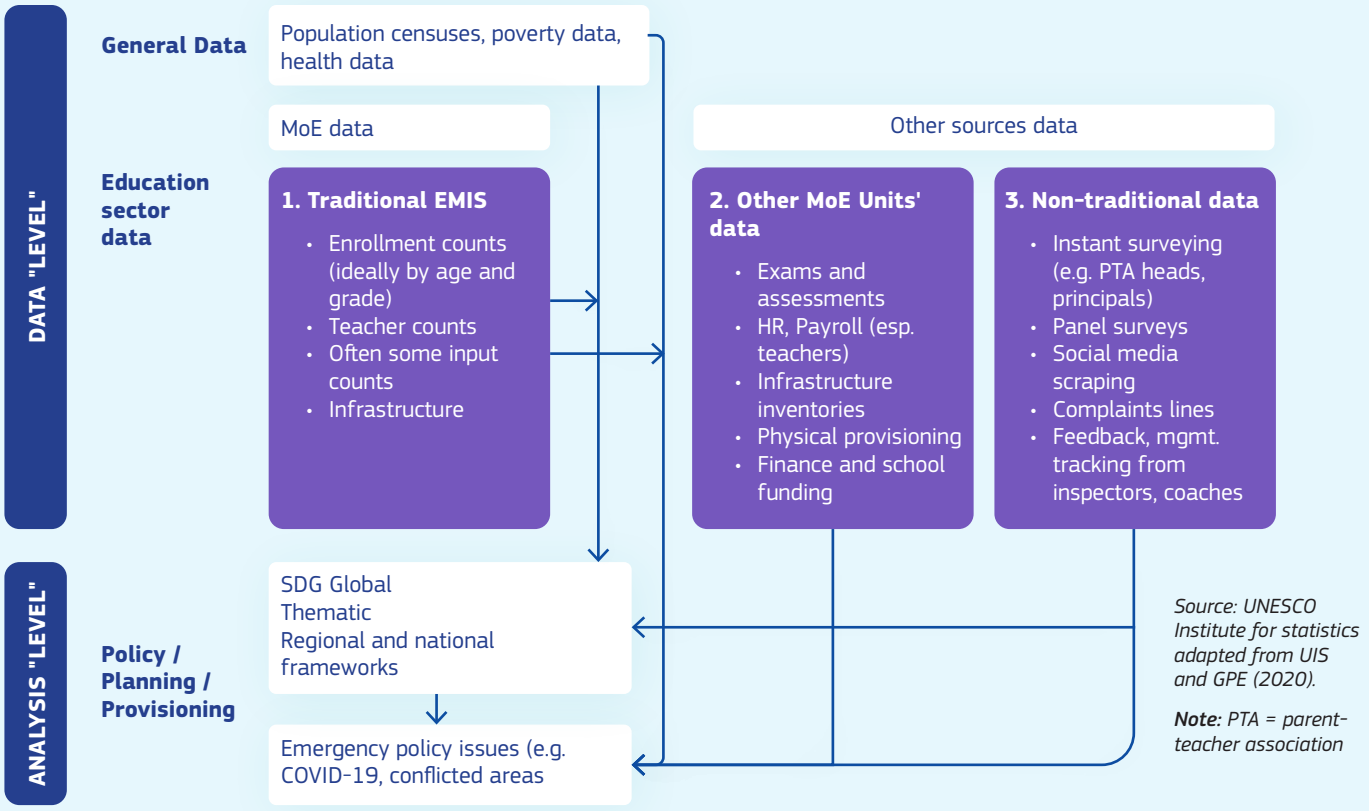
The digital transformation of VET system management

The digital transformation of VET not only impacts teaching and learning but also provides opportunities for the management of VET systems and training institutions. Digital technologies, such as **Education Management Information Systems (EMIS)**, can facilitate the collection, management and analysis of data. Ultimately, effective decision-making relies on quality data managed within efficient information systems. An EMIS does not only facilitate operational processes through the collection of information on resources and planning, but can also facilitate strategic decision-making, policy formulation and budgeting (UNESCO-UIS, 2020). Furthermore, an EMIS can support the collection of key data to monitor progress of key indicators for the achievement of the SDGs related to skilling. In such contexts, Open Source Management Information Systems can potentially be leveraged, for example DHIS2 for Education[8] or OpenEMIS[9]. These types of EMIS can be freely installed and used, and the source code is openly accessible for the community to adapt to emerging and context-specific needs. In order to ensure there are sufficient incentives for all stakeholders (Ministry of Education, Ministry of Labour, teachers/ training institutions and students) to provide regular and quality data, an EMIS should serve the interests of both central and decentralised authorities. To ensure that VET responds to labour market demand, it can be useful to include data in an EMIS from the **Labour Market Information System (LMIS)**. A LMIS includes quantitative or qualitative data and analysis related to employment and the workforce (e.g., employment data by location and occupation, labour supply and demand, earnings, unemployment, and demographics of the labour force). A LMIS can also allow the exchange of information between different stakeholders to inform functions such as governance, developing standards, designing and developing courses, and accreditation.

Data analytics drawing on both LMIS data and TVET data from Education Management Information Systems (EMIS) can support training design and delivery that is of direct relevance for the labour market.

If not well coordinated these opportunities can also become challenges. Whereas an integrated EMIS, especially when combined with LMIS data, provides great advantages for evidence-based and data-driven decision-making, the different components of an EMIS or LMIS are often developed as separate data management platforms for the purpose of one specific stakeholder (UNICEF, 2020). For instance, **in some countries existing management information systems provide only fragmented information** on teachers, enrolment or infrastructure, do not cover both informal and informal training providers for skilling or lack the integration of decentralised data at institutional level to the centralised ministry level. The integration of these systems in an overarching EMIS can greatly increase the usability for strategic decision-making, but the lack of data standards and interoperability between these systems further complicates integration into a fully-fledged EMIS and/or LMIS.

EMIS IN A NUTSHELL



Source: UNESCO Institute for statistics adapted from UIS and GPE (2020).

Note: *PTA = parent-teacher association*

[8] DHIS2 for Education uses the free and open-source DHIS2 software platform for the collection, analysis, visualization, and use of aggregate and individual data from institutions of learning. https://dhis2.org/education/

[9] OpenEMIS is an Education Management Information System designed to manage data on every student, every day. https://www.openemis.org/

Europass Digital Credentials

A Europass Digital Credential is a digital record of learning achievements such as qualifications and diplomas, issued by the institution where you studied and therefore has the same legal value as paper-based credentials. It describes your qualification, and can also include information on your classes, grades, projects and other achievements. Europass Digital Credentials let you receive and share your digital degrees, diplomas and certificates from education and training institutions in an easy and efficient way. The Europass Digital Credentials system is managed by the European Commission and is free and secure. The system allows issuing and receiving of digital credentials in your existing software in a format supported across all EU and EEA Member States.

Finally, **digitally certified qualifications** can significantly increase worker and student mobility by facilitating the cross-border recognition of qualification, but only if (1) there is a national and international harmonised framework for qualifications and (2) if digital interoperability through a set of common standards, services and software is ensured. The Europass Digital Credentials Infrastructure for example allows institutions to issue digital, tamper-proof qualifications and other learning credentials within the European Education Area.

OPPORTUNITIES

- Collect, manage and analyse data for better resource management & monitoring data
- Digitally certified qualifications for mobility

CHALLENGES

- Fragmented data collection systems
- Poor quality of data
- Lack of interoperability (administrative & technical standards)

Digital literacy and skills

Today all citizens need to have digital competences (knowledge, skills and aptitudes) to live, work, learn and thrive in a world increasingly mediated by digital technologies (European Union, 2020). The increased deployment of digital technologies across all economic sectors, including in more traditional non-tech sectors, will require a more digitally skilled workforce at all skills levels and at all ages (European Skills Agenda, 2020). As such, **digital literacy[10] or basic digital skills are increasingly recognised as key transversal skills for all VET trajectories** (CEDEFOP, 2018). A study by the International Finance Corporation and the World Bank[11] (IFC &WB, 2021) on five countries in Africa, found that the demand for digital skills remains largely unmet. The study also concluded that by 2030 some level of digital literacy and skills would be required for 50-55 % of all jobs in Kenya, 35-45 % of all jobs in Côte d'Ivoire, Nigeria, and Rwanda, and 20-25 % of jobs in Mozambique. It is expected that 70% of this demand would be for digital literacy skills, with the demand for intermediate and highly specialized digital skills for employment in the digital economy expected to grow as well, but to a lesser extent.

In addition to the spread of digital technologies in many traditional manufacturing and service sectors, the emergence of new industries and services the digital economy is giving rise to demand for digitally intensive occupations such as data analytics, e-commerce, computer programming, robotics and digital manufacturing, etc. "*E-commerce, for instance, is thriving in emerging markets. In Africa, the number of online shoppers grew by an average of 18% every year from 2014 to 2019 (Davarpanah, 15 April 2020). Similarly, Southeast Asia's e-commerce market tripled from 2015 to 2020 and is expected to triple again by 2025 (Google et al., 2020)*" (OECD, 2021).

Argentina's Plan 111- Learn to code in a year, free and nationwide

Argentina's Plan 111, launched in August 2016, is a programme which aims to train 100,000 programmers, 10,000 undergraduate professionals, and 1,000 technology entrepreneurs over four years (Avella, 2017, CEPIT 2017). The programme consists of a two-semester course taught in technical schools, vocational training centres and universities and leads to a certificate with national validity and endorsed by the Ministry of Education and the Ministry of Production of the Nation. There is no age limit to enrol in the plan and it is open to anyone who has completed high school or is in the last year at an equivalent educational level. It allows professionals from other sectors to explore new paths and gives people who have not attended college an opportunity to gain training and start a career in the IT sector. The plan also includes a gender approach due to the existing gender disparities, prejudices and stereotypes that persist in Argentina.

[10] Digital literacy can be defined as "the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital devices and networked technologies for participation in economic and social life. It includes competences that are variously referred to as computer literacy, ICT literacy, information literacy, and media literacy."

[11] https://www.ifc.org/wps/wcm/connect/industry_ext_content/ifc_external_corporate_site/education/publications/demand+for+digital+skills+in+sub-saharan+africa

[12] To illustrate, the European Skills Agenda will strengthen digital skills development through support for EU ICT-Jump-Start trainings by providing short-term intensive trainings to tackle ICT skills shortages

These new job profiles often require high specialization ranging from intermediate to advanced skills. **For the intermediate digital job profiles the VET sector can play an important role by providing short-term training to tackle ICT skills shortages[12].** The virtual character of these jobs (in combination with a high overall demand in the global economy) allows also for high worker mobility and even provides opportunities for employment through online freelancing platforms, especially in economies with low domestic employment opportunities. The global digital skills gap has also stimulated some companies and not-for-profit organisations to provide both skilling and freelancing services in the area of software development.

Digital transformation in the labour market brings both challenges and opportunities. While digital skills training in VET can be an opportunity to ensure these opportunities can be grasped, it is also key to address gender[13] disparities[14]. With very few women participating in the technical and professional courses that lead to high-end jobs in the digital economy (World Bank, 2020), the potential of the digital economy for sustainable development may remain underexploited. **Furthermore, the digital transformation of the economy creates jobs, but at the same time digital automation also has the potential to significantly alter the labour market.** It is estimated that in the Latin America and the Caribbean (LAC) region, two out of ten jobs have the potential of being automated and four in ten jobs might substantially change in terms of tasks, with variation across the region (OECD, 2021). Finally, while new forms of own-account work via e-platforms and digital applications may widen opportunities, it is **also important to develop regulatory frameworks and social protections for this new type of employment** to prevent precarious working conditions.

Digcomp 2.1

The Framework European Digital Competence for Citizens offers a tool to support the improvement of citizens' digital competences. DigComp was developed by the JRC as a scientific project and with intensive consultation of stakeholders, initially on behalf of DG EAC (European Commission, Joint Research Centre, 2018). The latest version, DigComp 2.1, on behalf of DG EMPL was published in July 2022 by JRC. The DigComp framework identifies the different competences, organised in 5 competence areas, and describes the different proficiency levels (8 in total) for each of these competences.
In support of the monitoring of SDG Indicator 4.4.2 "Percentage of youth/adults who have achieved at least a minimum level of proficiency in digital literacy skills" UNESCO has developed "A Global Framework of Reference on Digital Literacy Skills". This framework builds on the EU Digcomp famework, but extents this further to include two more competence areas: (1) fundamentals of familiarity with hardware and software, which is considered particularly relevant for lower and middle income countries; (2) career-related competences, which are proposed to allow the identification of more specific competences in the use of digital technologies that are important productivity tools for particular business sectors.
The purpose of these initiatives is to define conceptual frameworks, which describe competences and proficiency levels in a relatively broad way so these can be adapted to different cultural, technological and economic contexts. Both frameworks therefore provide examples of applying these frameworks for specific use cases. Other related JRC works on digital skills and competences that are relevant for digital education and VET include: digital competence frameworks for educators (DigCompEdu) and educational organisations (DigCompOrg).

OPPORTUNITIES

- Digital literacy and basic digital skills for increased productivity & efficiency in traditional sectors
- Short and mid-term VET trainings for jobs in the digital economy

CHALLENGES

- Gender disparities
- Rapidly changing job profiles
- Automation impact on the labour market
- Decent working conditions for own-account and micro-work

[13] Gender is the main topic of one of the other Infosheets in this series
[14] Although gender disparities in digital skills and participation in the digital economy are a global trend, it is also useful to be aware of the gender ICT paradox: "Countries that are closest to achieving gender equality overall, such as those in Europe, have the fewest women pursuing the advanced skills needed for careers in the technology sector. Conversely, countries with low levels of gender equality, such as those in the Arab region, have the largest percentage of women pursuing advanced technology degrees. As an illustration, in Belgium only 6% of ICT graduates are women, while in the United Arab Emirates this figure is 58%. This paradox, observed here for the first time and explored in detail, underscores the need for measures to encourage women's inclusion in digital skills education in all countries." (UNESCO, 2019, I'd Blush if I could)

Digital VET: Ways forward

The digital transformation provides opportunities and challenges for VET today. In order to ensure that the full potential of digital for inclusive and quality VET is achieved and to deliver VET trajectories that support participation in the digital age, **comprehensive digital VET strategies and action plans need to be developed at organisational, national and regional level.** Furthermore, exchanges between and the **coordination of all stakeholders** involved (i.e., private sector, VET institutions, government, students, etc.) needs to be promoted to ensure that digital skills trainings are opportunity-driven and meet current and future labour market needs.

SELFIE

SELFIE is a free tool to help schools reflect on how they use digital technologies to support learning. The self-evaluation has a strong basis in research and is based on the European Commission Framework for Digitally-Competent Educational Organisations (DigCompOrg).
SELFIE anonymously gathers the views of students, teachers and educational staff as to what extent technology is used in their school and how this is supported across three dimensions: pedagogical, technological and organisational. The tool then generates a report identifying the organisation's strengths and weaknesses in the use of technology for education or training.
SELFIE enables educational organisations or partners (e.g., companies supporting work-based learning) to get a picture of where they stand on the integration of digital technologies for education and training. The tool also allows them to develop an action plan to further enhance their digital capacity. SELFIE can be deployed at scale through a ministry or other central authority or organisation, or on a more individual basis by separate schools or training institutions. SELFIE can be customized to respond to different contexts.
A distinct module, SELFIE for Teachers, is available for primary and secondary school teachers to self-evaluate their digital competences based on the DigCompEdu.
The SELFIE factsheet is available HERE and the different self-reflection tools are available HERE.

The World Bank is contributing to the digitalisation of VET through their Digital Development Partnership (DDP) mechanism and the Digital Economy for Africa (DE4A) initiative. Reference can be made to their "Methodological Guidebook for Digital Skills Country Action Plans" (2021b), which is intended as a resource to help countries in Africa develop effective planning for the integration of digital skills in higher education and TVET. The guidebook builds on the EU DigComp 2.1 framework, and the European e-Competence Framework to develop a digital skills typology. With regard to the use of digital for learning and teaching in VET and supporting the management of VET systems, the World Bank´s Digital Development Partnership has also issued a report "Unleashing The Power Of Educational Technology In TVET Systems" (2021a) highlighting opportunities and examples.

Furthermore, UNESCO and partners (AUDA-NEPAD, GIZ, EFAF, etc.) also launched the Pan African Initiative for Digital Transformation of TVET and Skills Development Systems in Africa in January 2021, with the objective of providing guidance and developing an ecosystem for the integration of ICT and digital in VET in Africa and with a preparatory report to be released in 2022.

With regard to European neighbourhood countries, the European Training Foundation (ETF) supports policymakers in the partner countries to design and implement digital skills and learning strategies to modernise vocational education and training systems to meet today's challenges and opportunities. They also raise awareness amongst policy makers and practitioners about the contextualisation and use of EU developed tools, such as SELFIE and the EU Digital Competence Framework for citizens and the Digital Competence Framework for Educators to support distance and online learning and integration of digital skills in education and training.

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