

Raising the digital capacities of TVET teaching staff: insights and lessons from a trends mapping study

Abstract

TVET teaching staff play a vital role in providing TVET learners with the digital skills and competencies needed for a rapidly evolving, technologically advancing world of work and learning. Yet in all countries across the world, TVET teachers and trainers encounter multiple challenges both in accessing high-quality, relevant digital skills development opportunities and in obtaining the institutional support needed to effectively integrate technology in their teaching and training practices. These issues were explored in a recently published UNESCO-UNEVOC study on digital skills development in TVET teacher training, which collated data from existing surveys and reports to provide a global overview of trends, challenges and promising practices in TVET teacher and trainer digital skills development across different regions and country contexts (UNESCO-UNEVOC, 2022). While the study has filled a gap in knowledge on TVET teachers'/trainers' access to digital skills training and support, issues concerning its methodology, and thus also its findings, should be acknowledged.

This paper summarizes the main findings of the UNESCO-UNEVOC trends mapping study, but also reflects upon its purpose, methods and conclusions. It points to future work to be done to provide a reliable evidence base and inspiring examples for designing effective digital skills policies and programmes.

Keywords: *Digitalization, TVET, teacher training, digital skills, ICT skills, digital divide*

1 Introduction: Importance of TVET teaching staff digital readiness

Digitalization has led to extensive changes in the skills required for work and life. The World Economic Forum (2020, 5) estimates that “by 2025, 85 million jobs may be displaced by a shift in the division of labour between humans and machines, while 97 million new roles may emerge that are more adapted to the new division of labour between humans, machines and algorithms”. Employers increasingly demand workers who have not only basic digital skills, such as the ability to create and edit digital documents or to communicate using email and social media, but also advanced digital skills relating to their specific occupations, such as the ability to develop apps, create content and/or use augmented and virtual reality technologies. TVET stakeholders from 56 countries responding to a 2019 UNESCO-UNEVOC survey on the future of TVET teaching and learning cited growth in ICT/ digitalization as the biggest change to have occurred in the world of work over the past five years and considered

digital/ICT skills to be the second most important skill needed by workers over the next ten years (UNESCO-UNEVOC 2020a).

Digitalization has also transformed the world of learning by expanding formal education and training opportunities through growth in online courses and MOOCs, as well as by opening access to a wealth of online resources that can be obtained anywhere, at any time and by anyone, allowing for learning to take place outside of formal environments in the context of lifelong learning. According to the International Telecommunication Union (2021, 5), 71% of the world's youth population aged 15-24 were using the internet in 2020. Although the extent to which young people have online access differs between developed and developing countries, as well as according to gender, digitalization has nevertheless had an impact on young people's preferred learning styles.

For TVET institutions to remain relevant and attractive, they need to identify and introduce digital skills and competencies for the changing world of work and to utilize the opportunities provided by digitalization, particularly distance learning. Their success in harnessing the benefits and tackling the challenges of digitalization depends largely on the capabilities of TVET teaching staff. Yet, as a new UNESCO-UNEVOC trends mapping study on digital skills development in TVET teacher training shows, TVET teachers and trainers face multiple challenges in keeping up with the latest digital transformations and continuously upgrading their skills to offer high-quality, learner-centred, technology-aided instruction (UNESCO-UNEVOC 2022). The COVID-19 pandemic has also revealed divergences in countries' preparedness in terms of distance learning and abilities to address the digitalization challenge effectively.

The remainder of this paper will, firstly, outline the impetus for and main findings of the UNESCO-UNEVOC trends mapping study on digital skills development in TVET teacher training (Section 1) and, secondly, reflect on the study's methodology, and thus also its findings, to highlight issues that still need to be addressed to develop effective policies and strategies for improving TVET teachers' and trainers' digital capabilities and mindsets (Section 2). The final section (Section 3) considers the implications of this analysis for future responses to the digitalization challenge through the medium of TVET teacher/trainer capacity building and points to future work to be done to provide a reliable evidence base and inspiring examples for designing effective digital skills policies and programmes.

2 Impetus for and key findings of the UNESCO-UNEVOC trends mapping study on digitalization in TVET teacher training

The UNESCO-UNEVOC trends mapping study on digital skills development in TVET teacher training was commissioned to address a lack of internationally comparable data on progress made and challenges persisting in building TVET teachers'/trainers' digital skills, attitudes and competencies (UNESCO-UNEVOC 2022). The study sought to fill this gap by compiling data and information from existing surveys and reports to produce a global

overview of trends, challenges and promising practices in the digital skills development of TVET teachers and trainers both before and during the COVID-19 pandemic. The main method of data collection was desk research (literature review and documentary analysis), supplemented by in-depth interviews with selected TVET teacher training institutions that had been identified as having innovative or impactful practices, while the focus of the study was on the training and support received by teaching staff in formal public and private TVET institutions.

One early finding of the study was that little global-level data on TVET teachers'/trainers' digital capabilities were available prior to the COVID-19 pandemic. The OECD's 2018 Teaching and Learning International Survey (TALIS), which gathered data from over 260,000 teachers and 15,000 school leaders in 51 countries/economies, captured teacher experiences in mainly OECD countries and provided information on upper secondary vocational education and training (VET) teachers' most urgent professional development needs as well as the key barriers to their professional development (OECD 2021a; OECD, 2019a). However, because TALIS 2018 focused on teachers' professional development in general and not their digital skills development in particular, it did not provide information on whether, how often or what kinds of digital skills training is available to TVET teaching staff. The European Commission's SELFIE (Self-reflection on Effective Learning by Fostering the Use of Innovative Educational technologies) tool likewise collects data on European upper secondary VET teachers' propensities to use digital technologies in their teaching, but does not gauge the level or depth of skills that these teachers possess (OECD 2021a).

The trends mapping study therefore mainly derived its information on pre-pandemic trends from its predecessor study, the 2019 UNESCO-UNEVOC Study on the Trends Shaping the Future of TVET Teaching, which had a small sample size of only 87 respondents across 56 countries, but was nevertheless one of the few surveys providing global-level data on TVET teachers'/trainers' access to digital skills training prior to the pandemic (UNESCO-UNEVOC 2020a). An ILO-UNESCO-World Bank online survey of 985 TVET providers across 92 countries, which was conducted between 3 April and 15 May 2020, also provided data on the status of digitalization in TVET prior to the COVID-19 pandemic, but with 20/20 hindsight that a pandemic would occur in 2020 (ILO et al. 2021).

Lack of a strong evidence base on TVET teachers'/trainers' digital skills and training needs likely explains, or perhaps reflects, why policies/strategies for digitalizing TVET across all countries are weak. According to the ILO (2020) and the European Commission (2020, 103–108), at the time that the COVID-19 pandemic hit, most countries across the world lacked a national policy/strategy on digitalization in education, and those with such policies tended to target general education without also covering the TVET sector. Moreover, while many countries regularly conducted skills forecasts to gather data on the new skills required in a digital economy, the channels for transmitting the data to TVET institutions and practitioners have tended to be weak, meaning that TVET institutions – which are the main providers of in-service training for TVET teaching staff – often lacked information on what skills TVET teaching staff need to effectively integrate digital technologies into their teaching practices

and/or to use digital tools and resources to deliver effective online or offline distance learning (UNESCO-UNEVOC 2020a).

Another key finding of the trends mapping study was that, across all countries, the focus of the digital skills training provided to TVET teaching staff differed prior to the pandemic compared to during the pandemic (UNESCO-UNEVOC 2022). Prior to the pandemic, little attention was paid to developing TVET teachers'/trainers' capacities for using digital communications tools and/or online learning platforms to deliver TVET at a distance. Only just over one-half (52%) of TVET teaching staff who responded to the 2019 UNESCO-UNEVOC survey reported being offered training on how to deliver TVET using alternative (including digital) formats (UNESCO-UNEVOC 2020a). Key reasons for this include negative perceptions regarding the relevance and/or effectiveness of distance learning approaches for delivering TVET content, and/or the high costs of online/digital delivery for TVET institutions, particularly in cases where government funding for TVET is low (Hoosen & Butcher 2017, 185).

While in some contexts TVET teaching staff were using digital tools and resources to deliver remote or hybrid training prior to the pandemic, the push for improving teachers'/trainers' capacities to do so was strongest in developing countries, aided by donors and international partners, as a means of expanding access to TVET for the growing numbers of young people exiting secondary education (Mead Richardson & Herd 2015). This impetus was not as strong in higher-income countries, although there were exceptions, such as in countries with sparse populations (e.g. Australia) or those targeting groups (e.g., older workers) with specific training needs (Kearns 2009; Mead Richardson & Herd 2015). In most cases, training for TVET teaching staff in these countries focused on building teachers'/trainers' capacity to integrate ICT tools and services into their in-class teaching-learning processes to provide learners with relevant skills for the future of work and for lifelong learning (OECD 2019a, 6). Over 90% of TVET practitioners responding to the 2019 UNESCO-UNEVOC survey, who reported having received training in digitalization areas, stated that their training had covered how to use new instructional tools and/or educational technologies for teaching TVET, while 75% stated that it had covered new digital technologies, equipment and/or practices in the workplace (UNESCO-UNEVOC 2020a).

A “pivot” in the focus of TVET teacher digital skills training took place once the pandemic hit, and governments and TVET institutions scrambled to put in place measures to ensure learning continuity in the wake of pandemic-related school closures. Digital skills training for TVET teaching staff during the period from March to July 2020 mainly took place online and focused on improving TVET teachers'/trainers' capacity to deliver training remotely (ILO et al. 2021). In most cases, TVET teaching staff were expected to engage in self-learning or peer learning to develop these skills, but found it challenging to do so given their heavier workloads and higher costs (e.g. home internet), both for delivering and for undergoing training (OECD 2021b). Furthermore, most TVET teachers/trainers received little employer

support (e.g. financial reimbursement or paid time off work) to engage in training, reducing their motivation to develop competencies needed to deliver high-quality technology-enhanced distance learning.

TVET teachers'/trainers' access to digital skills development opportunities, and consequently their capacities for utilizing digital technologies for teaching-learning and/or for delivering TVET at a distance, were found to differ by country income-level classification. While access to digital skills training has expanded in nearly every country since 2018, it has grown most rapidly in upper-middle and high-income countries (UNESCO-UNEVOC 2020a). The primary reasons for low access to digital skills training in low- and lower-middle-income countries are supply-side factors: systematic lack of resources, lack of digital or electrical infrastructure, and lack of trained trainers with digital skills and knowledge (Mead Richardson & Herd 2015; Langthaler & Bazafkan 2020). In upper-middle and high-income countries, the main issue has been the relevance, rather than the availability, of digital skills training programmes for TVET teaching staff – in particular, a lack of sufficient training focus on how to apply digital technologies to improve the quality and relevance of training provided to learners (OECD 2021a, 138-140).

The study's findings suggest that the digital divide between low-income and high-income countries in terms of teachers'/trainers' capacities to deliver TVET using online and/or offline distance learning approaches has more than doubled since the pandemic began (see Table 1). Prior to the pandemic, 30% of TVET providers in Europe, the Americas and the Asia-Pacific regions reported having used online and/or offline distance learning approaches very often or regularly, compared to just 5% of TVET providers in Africa (ILO et al. 2021). While the exigencies of the pandemic led to global growth in the proportion of TVET providers offering fully remote online and/or offline training, 75% of TVET providers in high-income countries in April/May 2020 – but only 18% of those in low-income countries – had the capacity to deliver such training (ibid).

Owing to a lack of data covering both the pre-pandemic and pandemic periods, it is not possible to assess whether the digital divide in TVET teachers'/trainers' capacities for integrating digital tools and services into their in-class teaching-learning processes has widened or narrowed in recent years. Most surveys of TVET teachers'/trainers' digital capacities that have been produced since the pandemic have focused solely on teachers'/trainers' access to training in remote/hybrid teaching and related ICT skills (e.g. OECD 2021b, 21).

Yet, it is worth noting that, while digital skills training programmes for TVET teaching staff have tended to focus on one or the other dimension of digitalization – that is, use of digital tools and services for teaching TVET prior to the pandemic, and use of digital communications tools and online learning platforms for delivering TVET remotely or through blended methods during the pandemic – the two dimensions are not mutually exclusive. After all, teachers/trainers delivering fully online modules may decide to use educational technologies to teach specific concepts or skills. Nevertheless, each dimension requires

differentiated training and support. Furthermore, a clear long-term vision of educational goals, with well-developed and well-resourced policies and strategies for achieving them, is needed to provide teachers/trainers with the skills they need to fulfil their role in both areas.

Table 1: Trends and Challenges in TVET Teacher Digital Skills Development before and during the COVID-19 Pandemic

PRE-PANDEMIC SITUATION

Trends/challenges	Low/Lower-middle income countries	Upper-middle/High income countries	All countries
Access to training on use of digital tools and services for teaching TVET	Low access to digital skills development opportunities	Limited access to <i>quality/relevant</i> digital skills development opportunities	>75% of TVET teaching staff (Source: UNESCO-UNEVOC, 2020a)
Access to training on how to deliver TVET using alternative (including digital) formats	N/A	N/A	52% of TVET teaching staff (Source: UNESCO-UNEVOC, 2020a)
Main supply-side barriers to accessing digital skills development opportunities (low/lower-middle income) Main supply-side barriers to accessing quality/relevant digital skills development opportunities (upper-middle/ high income countries)	<input type="checkbox"/> Systematic lack of resources <input type="checkbox"/> Lack of ICT and other infrastructure <input type="checkbox"/> Weak policies/strategies on digitalization in TVET <input type="checkbox"/> Lack of suitably skilled trainers <input type="checkbox"/> Lack of TVET-specific teacher training content	<input type="checkbox"/> Weak policies/strategies on digitalization in TVET <input type="checkbox"/> Weak systems for ensuring relevance of TVET teacher training content <input type="checkbox"/> Lack of training on how to apply digital technologies to develop learners' digital and future-oriented skills	
Main barriers to accessing training in digitally-enhanced distance learning approaches	<input type="checkbox"/> Perceived lack of relevance of distance learning for TVET <input type="checkbox"/> Perceived lack of effectiveness of distance learning approaches <input type="checkbox"/> High costs of digital TVET delivery for providers <input type="checkbox"/> Lack of knowledge/ information regarding pedagogical skills needed for effective digital TVET delivery	<input type="checkbox"/> Perceived lack of relevance of distance learning for TVET <input type="checkbox"/> Perceived lack of effectiveness of distance learning approaches <input type="checkbox"/> High costs of digital TVET delivery for providers <input type="checkbox"/> Lack of knowledge/ information regarding pedagogical skills needed for effective digital TVET delivery	
Main demand-side barriers to uptake of digital skills development opportunities	<input type="checkbox"/> Lack of time for training <input type="checkbox"/> High cost of training <input type="checkbox"/> Negative attitudes towards new technology/resistance to change <input type="checkbox"/> Lack of knowledge/ information regarding digital skills needs <input type="checkbox"/> Also: Lack of incentives to counteract demand-side barriers	<input type="checkbox"/> Lack of time for training <input type="checkbox"/> High cost of training <input type="checkbox"/> Negative attitudes towards new technology/resistance to change <input type="checkbox"/> Lack of knowledge/ information regarding digital skills needs <input type="checkbox"/> Also: Lack of incentives to counteract demand-side barriers	
Extent to which digital tools and services were integrated into TVET learning environments	Most TVET teachers/trainers who received digital skills training were at ' <i>emerging</i> ' or ' <i>applying</i> ' stages of ICT adoption	Most TVET teachers/trainers who received digital skills training were at ' <i>applying</i> ' or ' <i>infusing</i> ' stages of ICT adoption	
Main barriers to integration of digital technologies in teaching/training practices	Negative attitudes/resistance to change, <i>linked to</i> : – <i>lack of adequate pedagogical and/or digital skills</i> – <i>lack of experience in using ICTs</i>	Lack of confidence, <i>linked to</i> : – <i>lack of teacher competence</i> – <i>lack of personal access to ICT resources</i> – <i>lack of technical support</i>	
Extent to which TVET teaching staff used online/offline distance learning very often or regularly	5% of TVET providers in Africa (Source: ILO et al, 2021)	30% of TVET providers in Asia-Pacific, Americas and Europe (Source: ILO et al, 2021)	30% of TVET providers globally (Source: ILO et al, 2021)

PANDEMIC RESPONSE

Trends/challenges	Low/Lower-middle income countries	Upper-middle/High income countries
Access to training on use of digital tools and services for teaching TVET	N/A	N/A
Access to training in remote/hybrid teaching and related ICT skills	Few coordinated national programmes to develop TVET teachers'/trainers' skills in designing and managing distance learning programmes. Some TVET institutions worked with NGOs or companies to train teaching staff in (mainly offline) distance learning modalities. <i>(Source: eLearning Africa and EdTech Hub, 2020)</i>	In 96% of OECD countries, TVET teaching staff received training and support to develop their remote/hybrid teaching and related ICT skills, often through new public-private partnerships. However, in some cases <i>training quality</i> was an issue. <i>(Source: OECD, 2021b)</i>
<p>Main supply-side barriers to accessing training and support in distance learning modalities (low/lower-middle income)</p> <p>Main supply-side barriers to accessing <i>quality</i> training and support in distance learning modalities (upper-middle/ high income countries)</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lack of adequate human and financial resources <input type="checkbox"/> Inadequate infrastructure and limited access to ICT resources <input type="checkbox"/> Lack of suitably skilled staff to train TVET teachers/trainers in distance learning modalities <input type="checkbox"/> Lack of training in designing/managing distance learning programmes 	<ul style="list-style-type: none"> <input type="checkbox"/> Lack of TVET-specific crisis response policies/strategies <input type="checkbox"/> Lack of TVET-specific digital tools and resources <input type="checkbox"/> Lack of effective training on how to apply ICTs to deliver student-centred distance learning
Main demand-side barriers to engaging in and integrating training received in ICT-enhanced distance learning modalities	<ul style="list-style-type: none"> <input type="checkbox"/> Lack of time for undergoing and integrating training <input type="checkbox"/> High costs of undergoing and delivering training <input type="checkbox"/> Negative attitudes/resistance to change <input type="checkbox"/> Mental health issues <input type="checkbox"/> Also: Lack of incentives to counteract demand-side barriers 	<ul style="list-style-type: none"> <input type="checkbox"/> Lack of time for undergoing and integrating training <input type="checkbox"/> High costs of undergoing and delivering training <input type="checkbox"/> Negative attitudes/resistance to change <input type="checkbox"/> Mental health issues <input type="checkbox"/> Also: Lack of incentives to counteract demand-side barriers
Extent to which digital tools and services were integrated into TVET learning environments	N/A	N/A
Extent to which fully remote online and/or offline training was provided during school closures	18% of TVET providers in low-income countries were able to provide fully remote training <i>(Source: IL O et al, 2021)</i>	75% of TVET providers in high-income countries were able to provide fully remote training <i>(Source: IL O et al, 2021)</i>

Source: UNESCO-UNEVC 2022, 49-50

3 Reflections on the study's purpose, methodology and findings

The purpose of the trends mapping study was to undertake a rapid assessment of the available literature and evidence on the state of digital skills training provided to TVET teaching staff pre-COVID-19 and during the pandemic, and then to identify any observable trends and challenges as well as examples of good practice. The study's findings on trends and challenges are summarized in Table 1. The aim of this section will be to reflect on those findings by demonstrating how the study's prescribed methodology, combined with lack of a clear and widely agreed definition and framework for conceptualizing "digital skills", has limited the extent to which the findings can be translated into actionable recommendations.

This section's argument may be summarised thus. The trends mapping study's evidence on **global trends** in TVET teacher digital skills development is subject to a considerable degree of error owing to differing definitions of "digital skills" being applied in the various surveys used to compile the data. Its evidence on **challenges** – that is, the barriers to TVET teachers'/trainers' digital competence development – is more reliable, since not only are the

categories used to define these barriers more consistent over time and across regions, but the methods used to measure how far these barriers act as obstacles to teachers'/trainers' effective use of digital tools and resources for teaching and/or delivering TVET are also more robust. The latter set of data is thus more usable than the former for developing effective policies and programmes for promoting digitalization in TVET through TVET teacher training. The next two subsections elaborate on these points.

3.1 Findings on global trends in TVET teacher digital skills development

The trends mapping study identified some broad trends in TVET teachers'/trainers' access to digital skills training and capacities to use ICT for teaching and/or delivering TVET (see Table 1), but its evidence on trends is not reliable. This issue stems from the study's methodological reliance on existing surveys and reports to construct an overall/global picture of trends, and inconsistencies across the various surveys which include the following:

- Lack of a clear and consistent definition of “digital skills” as they relate to the skills needs of TVET teaching staff;
- Lack of a common basis for measuring TVET teachers'/trainers' digital skills; and
- Lack of an agreed framework regarding what digitalization means for the training needs of TVET teaching staff.

The term “digital skills” is not clearly defined across the different surveys, and without a working definition it is difficult to ascertain what digital knowledge, skills, competences and mindsets TVET teachers/trainers need to use technology effectively to deliver quality teaching both in classrooms and online. The challenges of defining up-to-date relevant digital skills can be observed in the indicators for Sustainable Development Goal 4 relating to quality education and training. Indicators 4.4.1 and 4.4.2. pertain to ICT skills and digital skills, respectively (Montoya 2018). Yet, thus far, disaggregated data on Indicator 4.4.2 (“the percentage of youth/adults who have achieved at least a minimum level of proficiency in digital skills”) remain limited. An operational definition of “digital skills”, as well as of “proficiency”, is needed to support the digital skills needs of teaching staff as they acquire competences in the use of ICT for professional purposes.

There are some examples of attempts to define the digital skills and competences needed by TVET teaching staff, such as the European Union's European Framework for the Digital Competence of Educators (DigCompEdu) and the UK's Digital Competence Professional Framework (a promising practice example included in the trends mapping study). UNESCO-UNEVOC (2020b) has also developed a four-stage model of ICT adoption in TVET, which is shown in Table 2. Each of these frameworks includes proficiency levels. Yet while multiple digital competence frameworks exist, they do not all cover the same competencies, and some are not scaled to gauge teachers' proficiency levels in a given area (Law et al. 2018). Some of these frameworks also have limited applicability outside of the context for which they were developed. For example, DigCompEdu implicitly assumes that teachers/ trainers have access to digital infrastructure and equipment and possess basic digital skills, such as how to turn on

and operate a digital device; thus, it is not applicable to most developing country contexts (DePryck et al. 2019). Whether it is possible to adequately define and frame the digital skills needs of TVET teaching staff working in different digital and delivery contexts is an open question. After all, TVET teachers’/trainers’ digital skills requirements are likely not static across time, location, programmes, labour markets or target learners.

Table 2: UNESCO-UNEVOC'S four Stages of ICT Adoption in TVET

Stages of ICT adoption	Scope of ICT use by TVET teachers	Examples of the practical use of ICTs	Outcomes for TVET teachers	Resources available	Limitations
Emerging	Use of available ICT tools (and often limited ICT infrastructure and hardware)	Spreadsheet application to calculate assessment marks	Awareness of opportunities of ICTs to enhance TVET teaching and learning	Limited ICT infrastructure and hardware	Limited opportunities to apply the tools in courses or programmes
Applying	Use of ICT productivity tools for teaching and learning	ICT-enabled presentations with multimedia elements; Use of worksheets by students to record ideas	Awareness of opportunities offered by ICTs for TVET teaching and learning; Teachers seize opportunities but there is no change in the pedagogical strategies adopted by teachers in ICT-enabled learning environments	ICT infrastructure and hardware on campus in place	Teachers continue to act as the main drivers of learning
Infusing	Integration of ICT tools in lessons and courses to accommodate different learning needs	Virtual experiments conducted using digital mobile devices	Begin to use ICTs to support and empower students to monitor and manage their own learning	Necessary infrastructure and hardware are available to support ICT-enabled learning environments	Teachers are still the main organizers and initiators of teaching and learning activities
Transforming	Use of ICTs to support and empower students to monitor and manage their own learning; Teachers scaffold students’ reflections on their learning processes and outcomes	Use of internet-enabled applications such as learning management systems and e-portfolio systems; Use of e-portfolios as a form of assessment for student internships	Use of a range of ICT tools with different pedagogies to create engaging and meaningful learning environments	Teachers have access to robust ICT infrastructure, hardware and resources, and a transformed curriculum	Teachers facilitate student learning that may be bound by available content and institutional resources

Source: UNESCO-UNEVOC 2020b, 22

Lack of a clear and widely agreed definition of “digital skills” explains why the different surveys examined by the trends mapping study define and measure “digital skills” in different ways. For example:

- For TALIS 2018, the OECD used the terms “ICT skills” and “digital skills” interchangeably, and identified four areas in which upper secondary VET teachers need professional support to foster innovation (OECD 2019b):
 - Inclusion of ICT and cross-curricular skills in teacher pre-service education;
 - Inclusion of ICT and cross-curricular skills in professional development activities;
 - Sense of preparedness to teach cross-curricular skills and technology; and

- Professional development in using ICT in classrooms.

The need to prepare VET teachers to use digital tools and learning platforms to deliver TVET outside of classroom environments – e.g. through distance learning – was not included in TALIS as an area in which VET teachers need professional support to foster innovation, despite the OECD (2021a, 131) noting that “[f]uture VET teaching and learning are likely to comprise a mixture of face-to-face interactions making use of physical equipment and digital devices, and online interactions making use of digital technology”.

- The 2019 UNESCO-UNEVOC trends mapping survey, which was the main source of pre-pandemic global data for the *Trends mapping study on digital skills development in TVET teacher training*, contained three questions to gauge TVET teachers’/trainers’ access to (but not necessarily acquisition of) “ICT skills for teaching”, broadly defined (UNESCO-UNEVOC 2020a). The main question designed to assess TVET teachers’/trainers’ access to digital skills training offered a list of ten knowledge, skills and competencies pertaining to ICT/digitalization, which it asked respondents to choose from¹. Unlike TALIS, the survey gauged TVET teachers’/trainers’ access to training in new pedagogical approaches pertaining to the use of technology for teaching, as well as their exposure to training on how to deliver TVET using alternative (including digital) formats. However, it did not include questions to assess the quality, recency or regularity of training received by teachers/trainers, nor whether they had applied the skills they gained following training. The respondent pool for this survey included tertiary as well as secondary level teaching staff.
- An OECD/UIS/UNESCO/UNICEF/World Bank Special Survey, which gathered data from officials in charge of school education and education statistics in 38 OECD and partner countries between January and February 2021, focused on measures put in place during the pandemic to support VET teachers in developing their skills for remote or hybrid teaching (OECD 2021b). “Digital skills” in this case was defined as “remote/hybrid teaching and related ICT skills”.
- An eLearning Africa/EdTech Hub survey of 1,649 educators and technology specialists from 52 African countries conducted between 15 June and 15 July 2020 contained several questions to assess the training and support received or still needed by teachers to implement distance learning approaches during the pandemic (eLearning Africa and EdTech Hub 2020). The survey targeted teachers across all education sectors, so was not TVET-specific, and its questions were open-ended rather than containing categories of

¹ The ten knowledge, skills and competencies were: theories and concepts relating to ICT/digitalization; emerging skills in ICT/digitalization; new pedagogical approaches pertaining to the use of technology for teaching; how to use new instructional tools and/or educational technologies for teaching; new ICT-related workplace practices, technologies and/or equipment; how to integrate new ICT-related workplace practices, technologies and/or equipment into teaching and learning processes; how to develop learners’ digital/ICT skills; how to use, create and/or share online resources; how to facilitate student self-learning using technology; and how to assist students in developing and sharing their own online learning materials.

professional development required or received by teaching staff. Given the survey's lack of definition of "digital skills", respondents mentioned needing access to technology and materials as well as training, broadly defined.

It should be evident from the above discussion that an assessment of global trends derived through combining data from the aforementioned surveys, which were produced on disparate bases and address different questions, has implications for the validity and reliability of those findings. The underlying surveys vary not only in breadth (number of countries covered; TVET stakeholders surveyed) and depth (quantitative versus qualitative evidence), but also in terms of the indicators they examine and measure. Furthermore, given the "pivot" in how digital skills have been defined before versus during the pandemic (see Section 2), longitudinal data on global trends covering both the pre-pandemic and pandemic periods is lacking. For this reason, the trend mapping study's findings on trends are more useful as a basis for formulating hypotheses to undertake further research, rather than as a basis for developing digital skills policies and strategies.

3.2 Findings on barriers to TVET teachers'/trainers' digital competence development

On the other hand, the study's findings on the barriers to TVET teachers'/trainers' digital competence development are more robust, owing to greater consistency in how those barriers are conceptualized and reported across the different surveys and reports (see Table 1). The identified barriers are similar across the pre-pandemic and pandemic periods (e.g. lack of adequate human and financial resources in low/lower-middle income countries), and there are some commonalities across lower-income and higher-income countries (e.g. lack of time for undergoing and integrating training), allowing for inter-regional as well as cross-temporal comparisons to be made.

The study's evidence on barriers is also likely to be more reliable than its evidence on trends, owing to how surveys tend to gauge teachers'/trainers' digital competence and/or confidence levels². Self-reporting, which is the main method used, is a more valid measure for assessing teachers'/trainers' confidence levels than it is for gauging their competence levels. After all, studies suggest that people's cultural and personal backgrounds affect their self-assessment of their digital competence – with women, for example, "tend[ing] to under-report their abilities in using computers and the Internet, while men tend to overstate them" (Montoya 2018).

The four promising practices included in the trends mapping study illustrate how a focus on tackling barriers to TVET teachers'/trainers' digital skills development can contribute to the design of effective policies and programmes for improving teachers'/trainers' access to digital skills training and acquisition of high-quality, relevant digital competencies (see Table 3).

² "Lack of confidence" has been cited as a key barrier to TVET teachers'/trainers' capacities to integrate digital technologies in their teaching/training practices (UNESCO-UNEVOC 2022).

Table 3: Summary of Promising Practices included in the Trends Mapping Study

Promising practice	Enhance Digital Teaching Platform	Training for public TVET instructors in online distance learning	Velocity Arcademy gamified upskilling platform	Ideas Cube offline server and digital learning kit
Countries implemented (income classification)	United Kingdom (high income)	Indonesia (lower-middle income)	Cambodia (lower-middle income)	Burundi and Democratic Republic of the Congo (low income)
Implementing body	UK Education and Training Foundation (government training provider)	ILO's Women in STEM project, in partnership with Indonesia's Ministry of Manpower, and Skilvul (private digital training provider)	Velocity Arcademy (EdTech start-up)	Bibliothèques Sans Frontières (BSF, an international NGO)
Brief description	Online training platform containing free, bite-sized, accredited, self-learning modules mapped to the Digital Teaching Professional Framework (DTPF), a competency framework for teaching and training practitioners across all parts of the Further Education sector in England.	Free, accredited online training programme for public TVET instructors on the creation and delivery of online training. Training delivered by experts on specific topics, with Skilvul either providing the training or helping to source experts from its network.	Online upskilling platform aimed at equipping Cambodian teachers/trainers with up-to-date digital and pedagogical skills and competencies to help them to introduce new and more engaging teaching techniques and to deliver remote education and training.	BSF offers training and support to educators in areas of the world that lack connectivity. Its Ideas Cube is a portable nano-server which creates a local offline Wi-Fi hotspot, giving users access to a range of specially curated digital resources. BSF's digital learning kits contain the Ideas Cube, 20 tablets, a laptop, a projector, a camera and (if needed) solar panels.
Digitalization focus	Use of technologies for teaching TVET and for digitally delivering TVET	Use of technologies for digitally delivering TVET	Use of technologies for teaching TVET and for digitally delivering TVET	Use of technologies for teaching TVET
Year implemented	2019 (pre-pandemic)	2020 (during pandemic)	2020 (during pandemic)	2019 (pre-pandemic)
Key digitalization challenges addressed	<ul style="list-style-type: none"> - Lack of time for training - High cost of training - Negative attitudes towards technology (technophobia) - Lack of incentives to participate in training 	<ul style="list-style-type: none"> - Lack of suitably skilled trainers - High cost of training - Lack of access to training in rural areas - High costs of digital TVET delivery for providers 	<ul style="list-style-type: none"> - Lack of ICT and other infrastructure - Lack of suitably skilled trainers - Lack of incentives to participate in training - Linguistic barriers to training 	<ul style="list-style-type: none"> - Lack of ICT and other infrastructure - Lack of ICT equipment - Lack of suitably skilled trainers - High cost of training - Linguistic barriers to training

Source: Authors

Each of the four practices was designed to overcome key digitalization challenges in the countries or regions where they were implemented. For example:

- To address ICT infrastructure issues in the low- and lower-middle income countries where they operate, Bibliothèques Sans Frontières has engineered an offline digital training solution, while Velocity Arcademy has designed its platform to be usable in low bandwidth areas.
- To overcome a shortage of skilled trainers in online distance learning in Indonesia, the ILO recruited a private sector partner, Skilvul, which mobilized its own as well as its network's expertise to provide high-quality training on a range of relevant topics.
- To tackle the barriers that make some teaching staff unwilling to undergo digital skills training, such as lack of time or negative attitudes towards new technologies, the UK

Education and Training Foundation adopted micro-learning (5-minute modules) and describes the purpose of its training modules from a pedagogical, rather than a digital, perspective.

- To reward teachers'/trainers' participation in continuous professional development, the UK Education and Training Foundation and Velocity Arcademy have incorporated gamification into their platforms and introduced a system of digital badges.

The four promising practices also share some positive features to ensure that their target groups acquire high-quality, relevant, up-to-date and widely recognized skills. All four practices:

- focus on pedagogy as much as on building teachers'/trainers' digital skills;
- have taken steps to ensure their content is relevant and regularly updated; and
- involve government partners to gain accreditation for the training they provide, which enhances the recognition and portability of the skills developed by teachers/trainers³.

The practices therefore provide inspiring examples of how to design effective digital skills policies and programmes to promote digitalization in TVET through TVET teacher training.

4 Implications for future responses to TVET digitalization challenges

The UNESCO-UNEVOC trends mapping study was conducted to fill a gap in knowledge on global progress made and challenges persisting in equipping TVET teaching staff with the knowledge, skills, competencies and mindsets required to mobilize the power of digital technologies to improve TVET teaching and learning and to expand access to TVET through digital delivery. Little global-level data on these topics were available prior to the study being conducted, since most pre-pandemic surveys and reports focused on a given world region.

However, the study's methodological reliance on existing surveys and reports, which themselves were produced using different definitions of "digital skills" and disparate measures for gauging TVET teachers'/trainers' digital skills, has meant that its findings on trends are subject to a considerable degree of error and thus do not provide a reliable evidence base for formulating digital skills policies and strategies. On the other hand, its findings on barriers to TVET teachers'/trainers' digital competence development are more consistent over time and across national income categories so can be reliably used to develop policies and programmes for promoting digitalization in TVET through TVET teacher training. The four promising practices included in the trends mapping study were designed to overcome key digitalization challenges as well as ensure that teachers/trainers acquire high-quality, up-to-date, relevant and portable digital and pedagogical skills.

The study points to the need for two key steps going forward. First, future work should focus on more tightly defining "digital skills" and on determining the digital and pedagogical skills needed by TVET teaching staff to fulfil their roles in teaching and delivering TVET. Second,

³ The one exception to this is Velocity Arcademy, which is seeking but has not yet found an accreditation system for its training modules.

further promising practice examples are needed to inspire the development of – and thereby increase TVET teachers'/trainers' access to – digital skills training programmes providing high-quality, up-to-date, relevant and widely recognized digital and pedagogical skills.

The UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training is taking three steps to contribute to these aims⁴:

- Since 2022, UNESCO-UNEVOC has been preparing an online guide to the digital competence frameworks in existence globally, which target TVET teachers/trainers as well as learners/citizens. The guide will present different approaches taken by policy makers and non-governmental organizations in defining the range of digital skills and competencies viewed to be necessary to become a digitally competent TVET teacher. A series of articles and webinars will also be commissioned to present the guide and compare the frameworks.
- UNESCO-UNEVOC will continue to collect promising practices in TVET teacher digital skills development to contribute to further learning on the design of effective policies and programmes to overcome barriers that TVET teachers/trainers face in accessing and participating in digital skills training.
- A series of pages on the UNESCO-UNEVOC website will be devoted to the “Digital Skills Development of TVET Teachers and Trainers”. The pages will present the findings of the trends mapping study in a dynamic format and include links to the promising practices.

Increased demand for digital skills in the workplace and a growing appreciation for the crucial role that technology plays in expanding access to TVET – which became especially apparent during the COVID-19 pandemic – have focused global attention on the importance of equipping TVET teachers and trainers with high-quality, relevant digital skills and providing them with the resources and support they need to effectively integrate technology in their teaching and training practices. From this perspective, despite its shortcomings, the UNESCO-UNEVOC *Trends mapping study on digital skills development in TVET teacher training* has provided a valuable launch pad for the next phase of research and programme activities aimed at improving knowledge and understanding of how best to support TVET teaching staff to fulfil their vital role in supplying TVET learners with the digital skills and competencies needed for a rapidly evolving, technologically advancing world of work and learning.

⁴ Each of these initiatives will be available via UNESCO-UNEVOC's webpage on Innovation and the Future of TVET: [Innovation and the Future of TVET \(unesco.org\)](https://unesco.org)

References

- DePryck, K., Oldenstam, J., & Gaddum-Riedewald, D. (2019). Putting the DigCompEdu framework to work in developing countries: Continued Professional Development for ICT of teachers in Suriname. In: K. Graziano (ed.). Proceedings of Society for Information Technology & Teacher Education International Conference. Las Vegas: Association for the Advancement of Computing in Education. Online: <https://www.learntechlib.org/primary/p/207887/> (retrieved 27.04.2022).
- eLearning Africa and EdTech Hub (2020). The Effect of Covid-19 on Education in Africa and its Implications for the Use of Technology. A Survey of the Experience and Opinions of Educators and Technology Specialists. Berlin: ICWE.
- European Commission (2020). Innovation and Digitalisation: A report of the ET 2020 Working Group on Vocational Education and Training (VET). Luxembourg: Publications Office of the European Union.
- Hoosen, S. & Butcher, N. (2017). Considerations in costing ODL and ICTs. In: C. Latchem (ed.). Using ICTs and Blended Learning in Transforming TVET. Paris and Burnaby: UNESCO and Commonwealth of Learning.
- International Labour Organization (ILO) (2020). The Digitization of TVET and Skills Systems. Geneva: International Labour Organization.
- International Labour Organization (ILO), UNESCO, & World Bank (2021). Skills Development in the Time of COVID-19: Taking Stock of the Initial Responses in Technical and Vocational Education and Training. Geneva: International Labour Organization.
- International Telecommunication Union (ITU) (2021). Measuring digital development: Facts and Figures 2021. Geneva: ITU.
- Kearns, P. (2009). What are the Limits of ICTs and Media in the Delivery of TVET? An Australian Focus. In: Maclean, R. & Wilson, D. (eds). International Handbook of Education for the Changing World of Work: Bridging Academic and Vocational Learning, Volume 1. Bonn: UNESCO-UNEVOC.
- Langthaler, M. & Bazafkan, H. (2020). Digitalization, education and skills development in the Global South: an assessment of the debate with a focus on Sub-Saharan Africa. ÖFSE Briefing Paper, no. 28. Vienna: Austrian Foundation for Development Research.
- Law, N., Woo, D., Torre, J., & Wong, G. (2018). A global framework of reference on digital literacy skills for indicator 4.4.2. UNESCO Institute for Statistics information paper, no. 51. Montreal: UNESCO Institute for Statistics.
- Mead Richardson, A. & Herd, G. (2015). World Report on TVET: The Promise and Potential of ICT in TVET. Vancouver: Commonwealth of Learning.
- Montoya, S. (2018). Meet the SDG 4 Data: Indicator 4.4.1 on Skills for a Digital World. UNESCO Institute for Statistics Blog. Online: <http://uis.unesco.org/en/blog/meet-sdg-4-data-indicator-4-4-1-skills-digital-world> (retrieved 28.04.2022).

Organisation for Economic Co-operation and Development (OECD) (2019a). TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners. Paris: OECD.

Organisation for Economic Co-operation and Development (OECD) (2019b). How teachers and schools innovate: New measures in TALIS 2018. Teaching in Focus #26. Paris: OECD. Online: <https://www.llse.org.uk/uploads/datahub/4567ceb%5E03in-03/2019-11-18-OECD%20-%20Teaching%20in%20focus%2026.pdf> (retrieved 28.04.2022).

Organisation for Economic Co-operation and Development (OECD) (2021a). Teachers and Leaders in Vocational Education and Training. OECD Reviews of Vocational Education and Training. Paris: OECD Publishing.

Organisation for Economic Co-operation and Development (OECD) (2021b). Implications of the COVID-19 Pandemic for Vocational Education and Training. Paris: OECD Publishing.

UNESCO-UNEVOC (2020a). UNESCO-UNEVOC Study on the Trends Shaping the Future of TVET Teaching. Bonn: UNESCO-UNEVOC.

UNESCO-UNEVOC (2020b). Promoting quality in TVET using technology: A practical guide. Bonn: UNESCO-UNEVOC.

UNESCO-UNEVOC (2022). Trend mapping study: Digital skills development in TVET teacher training. Bonn: UNESCO-UNEVOC.

World Economic Forum (2020). The Future of Jobs Report 2020. Cologne/Geneva: World Economic Forum.

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