TVET teachers for the Fourth Industrial Age: Digital competency frameworks

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Abstract

The Fourth Industrial Revolution, sometimes referred to as the digital age, is a time of endemic globalization. Modernization brought about by technological growth touches many facets of society, including vocational education. The integration of technology in vocational education has provided a shift in the conventional learning paradigm to more technology-based learning. In order to provide vocational training that can support future human capital needs to adapt to new technologies in this digital era, TVET teachers need to improve their digital competencies. This paper discusses digital competency frameworks that are useful for TVET teachers in their work as they support learners in the context of digital change. This paper forms part of a project initiated by UNESCO-UNEVOC to create an online reference point for digital competence frameworks produced by state and non-state actors across the world.

1. Introduction

Despite the growing demand for TVET across the world, there are challenges associated with ensuring an adequate supply of trained TVET teachers. In the OECD there are shortages of TVET teachers across countries (OECD 2021) and difficulties in ensuring they are adequately trained. Incentives to train are not always in place and support for those who enter TVET teaching from industry to develop the foundational pedagogic skills not universally present (UNESCO-UNEVOC 2022). TVET teachers are also sometimes compelled to use curricula developed by academics who have limited knowledge of local needs or industry standards. The need for TVET teachers to develop digital competencies to ensure their learners are prepared for the labour market associated with the Fourth Industrial Revolution appears another challenge for those in TVET to navigate. However, developing digital competencies may also present an opportunity to approach TVET teacher training in a new, engaging way.

This article will consider what the requirements are for effective TVET teachers in this technological age. After reviewing the wide role of the TVET teacher, a model for TVET teacher digital competence in the context of the Industrial Revolution 4.0 is outlined. The model is then discussed and several existing digital competence frameworks that can support TVET teachers outlined.

2. The role of the TVET Teacher

TVET teachers' responsibilities are wide ranging and include planning, providing advice, giving instructions, directing instruction, evaluating students' progress, and reviewing their work. Different methods are used by TVET teachers to integrate theory and practice into learning sessions. The emphasis on technical competencies is crucial for TVET teacher professional development in the era of the Industrial Revolution 4.0.

At a fundamental level, to create a supportive learning environment, TVET teachers should be able to manage and arrange their workshops and classrooms (Guthrie 2010). In order to plan curriculum and learning activities for efficient teaching and learning processes, they also need interpersonal and time management skills. Furthermore, to provide feedback that is appropriate for each student's needs and to make use of technology for supplementary learning activities, TVET teachers must also be aware of their students' qualities. Teachers must push students to learn

independently and inspire them to use the available learning tools in new and inventive ways to keep up with the latest technological advancements.

To help students meet learning objectives, identify their strengths and weaknesses, and enhance the quality of their instruction, a range of broad competency standards for TVET teachers have been established in different country contexts (Andersson & Köpsén, 2015), Arifin & Rasid 2017). In Malaysia for example, work by Aferro et al (2018) identified three main components of TVET teacher competency standards i.e. personal traits and professionalism, pedagogic skills and technical innovation.

The role of the TVET teacher appears broad and ever evolving. They must be capable of not just delivering a curriculum but also educating students regarding how to manage their careers (Duran & Yausssy, 2011). This encompasses providing support to facilitate students in their transition from school to the workplace. This requires TVET teachers to comprehend and keep up to date with changes in their institutions' curricula and industry demands (Zulkifli et al; 2018).

3. The Digital Competence Model for TVET teachers

In this more digitized age, there is a new set of competencies required for TVET teachers. As the International Labour Organization (ILO) states in 2020 '*With digital technology, the role of TVET teacher is increasingly not to deliver information, but to assist in interpreting information'*. They need to develop a range of technical skills in terms of digital pedagogy as well as an understanding of how learners are learning more individually or collaboratively through a multitude of technology-enabled methodologies including game-like learning environments and simulations. However, in doing this they also need to blend these new forms of knowledge with the parts of the TVET teacher skill set that continue to endure and remain relevant while evolving with technological change. Figure 1 below outlines a skill accumulation model for the 'digitally competent' TVET teacher.

Figure 1: TVET Teacher's Digital Competence Model
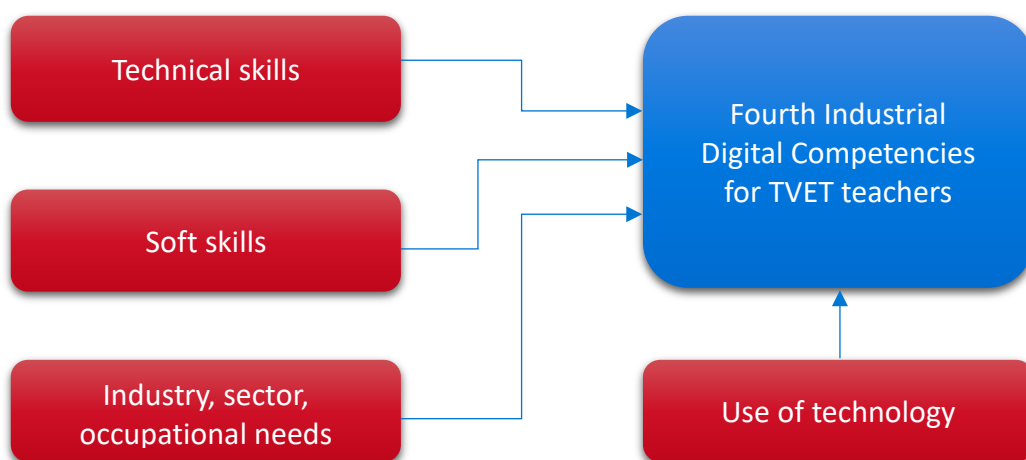
3.1.1 The elements of the model

Technical skills

Technical skill covers classroom management, student motivation and facilitation, career development, technology application, and subject matter mastery that is crucial in TVET education today. It involves instructional planning, delivery, and evaluation. Students today use smart devices from an early age, which presents challenges for teachers (Ally, 2019). TVET instructors must plan and prepare their instructional activities appropriately (Zulkifly et.al, 2018) so as to meet the learning needs of this generation. They must also tailor learning for each student individually (Ally 2019) and incorporate the instructional content digitally utilizing e-learning (Smolyaninova et al., 2019). Learning must be tailored individually for each student using up-to-date technology involving digital instructional content sometimes via e-learning.

Soft skills

TVET teachers must strike a balance between their technical and non-technical skills. Lifelong learning has emerged as a crucial competency for TVET teachers' career growth due to the frequent changes in technological innovation that necessitate new sets of skills. To fulfil the needs of each student specifically and to create an environment that is conducive to learning, the TVET teacher must be creative in building learning materials to support a broad range of learner skills. An inventive TVET teacher will create new learning materials, be actively involved in curriculum innovation by incorporating technology, and employ technological features to enhance the learning process (Duran & Yaussy; 2011; Guthrie 2010). These are the soft skills needed by the teacher to support a balance between technical and non-technical skills for student learning.

Industry needs

Industry wants to have confidence that educators have the most up-to-date abilities and understanding of the field that is necessary for quality instruction (Guthrie, 2010). Teachers must have an understanding and be able to communicate closely with industry on the attributes needed by graduates. This should not be a one-way-street, industry should also work closely with TVET teachers to develop some form of continuous programme to support and expedite curriculum design which includes the skill sets needed by industry.

Use of technology

Teachers in TVET learning institutions must create lessons that foster the development in their students' 21st century skills, which assists students to become active problem-solvers, team players, and digitally savvy citizens (Kale & Goh, 2014). To do this, they require appropriate instruction or professional development to more effectively integrate these skills into their lessons (Lambert & Gong, 2010; Wood et al., 2017). According to Duran, Yaussy, and Yaussy (2011), student achievement increased when they worked together and used their 21st century abilities. Hence the use of technology is important for TVET teachers to deliver and assist education electronically in the digital age.

Relevant existing digital competence frameworks

Digital competence frameworks provide a route for TVET teachers to define the capabilities needed to deliver effective teaching and against which they can assess their competence. A number of digital competence frameworks designed to support TVET teachers are included in the UNESCO-UNEVOC online reference point. Three of these frameworks are presented below. They demonstrate the distinct and contrasting approaches to the types of digital competence framework available to TVET teachers to access.

1. The South African Professional Development Framework for Digital Learning[1]

This framework is for all educators in South Africa. The purpose is to provide guidelines for professional development for educators *who use ICTs to enhance teaching and learning and leaders and support staff who are able to support the development of educator digital learning competencies (p9).* The aims of the framework are multiple and are listed as *inter alia:*

Education leaders and teachers (nationally, provincially and at district and institutional level) have a clear plan for professional development in terms of **digital learning.**

Learners achieve curriculum goals with the support of appropriate teaching and learning approaches and the **use of digital tools and content resources.**

Teachers entering the profession have a working knowledge of **digital learning competencies** (and professional development activities).

This framework encompasses a broad range of digital skills to be incorporated in their technological, pedagogical and content knowledge and utilized in learning activities. This framework supports the cultivation of competent educators in the technology-enhanced environment to deliver the essential digital literacy skills through effective pedagogical practices (which also integrate digital tools).

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[1] This framework can be accessed through UNESCO-UNEVOC's digital competence framework project page or directly at: https://www.education.gov.za/Portals/0/Documents/Publications/Digital%20Learning%20Framework.pdf?ver=2018-07-09-101748-953

2. Spanish Institute of Educational Technologies and Teacher Training Common Digital Competence Framework for Teachers (CDCFT)[2]

This framework is aligned with the European Commission's Digital Competence Framework (DigCompEdu). It was initially contextualized to Spain and published in 2017 by the Institute of Educational Technologies and Teacher Training (INTEF), an institution under the Ministry of Education, Culture and Sport (MECD) of the Spanish government. It is designed to support the essential competencies needed to enhance educators' instructional methods in the 21st century, as well as their professional development journey.

The CDCFT framework includes 21 digital competencies that were deemed essential for the teaching practitioner, centred around five key competence areas of (1) Information and Data Literacy, (2) Communication and Collaboration, (3) Digital Content Creation, (4) Safety and (5) Problem Solving. In the framework, these are defined at the levels of foundation, intermediate and advanced. Teachers can now self-assess their digital competencies with this framework, along with the validation process that follows, before receiving a Digital Competence Passport that can be presented to any educational administration as proof of their competency level. The intention of the definition of these competencies is to refine the educational standards that will be beneficial for students in the 21st century.

This framework is useful for all TVET teachers and has content that aligns closely with the soft skills and use of technology elements of the TVET Teacher Digital Competence Model described above. Through the digital competence passport, teachers can showcase and record their competency levels.

3. Profuturo Global Framework for Educational Competence in the Digital Age[3]

This framework is positioned in a resource that promotes equality of opportunity internationally through quality and equitable education using digital tools. The framework is designed to support training for teachers to use digital tools. The framework covers the development, training and advising of teachers according to various dimensions including the teacher identity, citizen identity, and the connector identity. These identities lead into the major elements of the teacher role of Design, Facilitation and Assessment. These elements are then aligned with functions, practices and key descriptors, which provide examples of practices. The tabular form of the framework is readily accessed and easy to understand. Through the use of this framework, TVET teachers can also be assisted in developing the tools required to ascertain what industry needs in their respective field. It enables teachers to build a case for themselves that they are able to teach the students in line with real world criteria and digital requirements.

Conclusion

New digital technologies will keep changing the delivery of TVET education and what is expected of a teacher/trainer's role in personalized learning environments. As well as the quantity of learners who complete programmes, educational systems will be evaluated on how well they equip students to thrive in the world of the 21st century and the Fourth Industrial Revolution.

The demand for digital knowledge and abilities is here to stay. Educational programmes, especially in TVET, are increasingly becoming dependent on digital literacy. It is essential to define, specify and incorporate digital resources into TVET curricula to enhance student growth as lifelong learners and labour market relevance. But before that, TVET teachers need to receive support and training. To tackle the issue of the rapid change in digitalization and globally digital competency requirements for TVET teachers in the time of Industry 4.0, access to existing digital competence frameworks such as those discussed above will play a vital role.

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[2] This framework can be accessed through UNESCO-UNEVOC's digital competence framework project page or directly at:
http://aprende.intef.es/sites/default/files/2018-05/2017_1024-Common-Digital-Competence-Framework-For-Teachers.pdf
[3] This framework can be accessed through UNESCO-UNEVOC's digital competence framework project page or directly at:
https://profuturo.education/wp-content/uploads/2020/10/MarcoProFuturo_Resumen-ejecutivo_ENG-online.pdf

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