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TVET@Asia Issue 19: Digitalisation in TVET – New Forms of Learning for the Future of Work

Rapid advances in technology and digitalisation trends in manufacturing sectors indicate that technical and vocational skills may eventually be replaced by robotic and artificial intelligence (AI) production processes. Certain professions may be taken over by digital technologies, possibly in the form of an AI or computational data-analysis software. These changes may give rise to a range of new work competencies: (1) tasks will be less routine and will become more complex; (2) critical thinking, complex problem solving, creativity and collaboration skills will become indispensable; (3) professionals will focus more on service orientation and negotiation; (4) cognitive flexibility will be essential; and (5) professional development and technical skills will continue to evolve (to cope with the fast-changing sector). Governments and industries around the world are devising policies, regulatory mechanisms, competency frameworks and continuing professional development in order to cope with the changes in work environments and expanding job profiles. In this issue, we look specifically into the current challenges in TVET and the adaptation of AI in manufacturing industries; the tripartite (government, industry and TVET institution) collaboration and policy formulation; institutional strategies and initiatives, curricula reforms in TVET institutions; the development of resources and implementation of the new norms of learning and teaching (e.g. online, blended, workplace-integrated learning and interdisciplinary learning); as well as the nurturing of digitally literate, technically competent and work-ready professionals for digitalised work environments.

The papers in this issue share holistic and yet specific views on the challenges of digitalisation in TVET. The authors contribute to the forward planning of TVET learning and practice in order to cope with the 'new' through their first-hand experiences and research findings. Their views range from the development of tripartite collaboration; the alignment of development skills to minimise industry-practice gaps; the current trends, challenges and practices in TVET teacher and trainer digital skills development; the importance of inter-company vocational training centres as drivers of innovation for the introduction of new digital technologies in dual-track vocational training; and the collaboration of skilled workers with robotic and artificial intelligence (AI) in production processes.

KARA CHAN, ANDREW HO, FLORIN C. SERBAN and MAGGIE FUNG from **Hong Kong** Baptist University have responded to the information and communications technology (ICT) and the creative industry's need for arts and technology talents (content curators, business designers, and creative technologists) for the art-tech sector. The authors

established and showcased a tripartite partnership between secondary schools, industry partners, and the Hong Kong Baptist University. The University and the industry partners jointly developed the curricula of two applied learning courses: Tech Basic and Multimedia Storytelling to be offered in senior secondary schools. During the course of study, industry partners provided out-of-classroom learning in the form of mentoring, guest lectures, and company visits to enhance students' creativity, analytical skills, problem-solving capabilities, and knowledge of entrepreneurship. The set-up of the courses within the university system, recruitment and maintenance of industry partners, and the evaluation mechanisms for the programme are also discussed in this paper.

Through an extensive thematic literature review of TVET practices, JESS MARK L. ALINEA (Philippine Normal University, **Philippines**) have identified the main themes in industry-practice gaps. The aim is to align development skills with the needs of industries in order to counteract mismatches or shortages in developed technical skills, thus enabling graduates to fulfil workplace expectations more effectively. The authors noted that 1) transversal skills as determinants of TVET employability, 2) mismatches and shortages of technical skills, and 3) administrative support as an integral part of TVET systems are all gaps that can be bridged through curriculum development and professional training. The most pressing issues relate to the enhancement of teaching and learning, fostering of academe-industry collaboration, promotion of work-based learning, as well as regular seminars and training to cope with industry demands.

GITA SUBRAHMANYAM (London School of Economics and Political Science, **UK**) and SARAH ELSON-ROGERS (**UNESCO-UNEVOC** International Centre for TVET) have addressed the need of digital skills and competencies for the rapidly evolving, technologically advanced world of work and learning. UNESCO-UNEVOC has devoted attention to these issues. The 2022 study on digital skills development in TVET teacher training provides a global overview of trends, challenges and promising practices in TVET teacher and trainer digital skills development in the context of different regions and countries. Reflecting on on the main UNESCO-UNEVOC findings, this paper shares inspiring examples for designing effective digital skills policies and programmes.

MARVIN LAND, MAREIKE MENZEL and THOMAS SCHRÖDER (TU Dortmund University, **Germany**)'s paper first stressed the value of Germany's dual-track vocational training and the importance of inter-company vocational training centres (IVTC). IVTCs complement and support the in-company vocational training of small and medium-sized enterprises and are considered innovation drivers for the introduction of new digital technologies. The authors highlighted how digital assistance systems (DAS) virtually accompany and support the practical vocational learning of trainees in IVTCs. Using the development and testing of DAS as part of the "EvAMEI" project at the Gemeinschafts-Lehrwerkstatt Arnsberg GmbH (GLW) as an example, this paper illustrates the integration of digital support through DAS into trainees' practical learning and working processes. Trainers demonstrated their dual role as innovators who actively participate in the development of DAS. They contributed their experience and expertise to the design, ultimately developing

and implementing the system in their training practice. The authors also drew attention to a switch in trainers' roles: they themselves are learners who need to be supported in finding and developing their new role as learning process facilitators and coaches. This is an integral element for the development of digital literacy.

MATTHIAS BECKER (Leibniz University Hannover, **Germany**), GEORG SPÖTTL (University of Bremen, Germany) and LARS WINDELBAND (Karlsruher Institut für Technologie) have examined the role of artificial intelligence (AI) and its impact on the economy, society, skilled work and work environments. Jobs losses are forecast as new professions emerge through the adoption of AI into work and manufacturing processes. The authors also looked closely into AI technologies and the impact of AI on vocational education and training, and on skilled workers. Furthermore, they discussed technological developments in expert systems, machine learning approaches, the concept of digital twins and the design of the human-machine interface in the context of AI enabled workplaces. Last but not least, the authors presented a model to evaluate cooperation between skilled workers and AI during the manufacturing process.

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