Frank Bünning, Christian Blobner, Guenter Podlacha (Eds.)

AI in TVET

Reflections and Implementations Across Academia, Industry, and Policymaking

OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

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Contents

Preface

F. Huebler

Artificial intelligence (AI) is redefining the way we learn, work and live. For Technical and Vocational Education and Training (TVET), this shift brings its own share of opportunities and challenges. AI can help make learning more engaging and adaptive, strengthen links between training and labour markets, and foster innovation. At the same time, it raises important questions about the future of teaching and learning and how education systems can respond to technological change.

UNESCO has been supporting Member States in addressing these issues, starting with the Beijing Consensus on AI and Education in 2019 and continuing through global consultations, guiding frameworks and policy recommendations on the ethical use of AI. These efforts aim to ensure that AI supports learning and development while upholding the principles of equity and inclusion.

Within this global effort, UNESCO-UNEVOC and the UNEVOC Network have advanced the discussion on what AI means for the future of skills development. The Otto von Guericke University Magdeburg has been a valuable contributor to this process. In cooperation with the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and Fraunhofer IFF, as part of the UNEVOC Centre "TVET for Sustainable Development", the university has created an ecosystem for research and knowledge sharing on digital transformation in TVET. The benefits of this ecosystem were evident during the Expert Meeting on AI and TVET that was held in Magdeburg in February 2025.

The event called attention to the importance of empowering educators and designing AI tools tailored to learners' needs, in line with UNESCO's call for a human-centred approach to AI. As human understanding struggles to keep pace with technological advances, peer learning and international cooperation have emerged as vital components of shared progress.

This publication was developed on the foundation of those exchanges. It combines perspectives that offer insight into current AI research and policy recommendations. The contributions examine frameworks for AI integration in higher education, centering on whether we are bridging gaps or building walls. The case studies focus on teacher preparation and generational adaptation, including practical experiences from in-service training programmes, AI-enhanced learning material development and the use of AI tools for transferring expert knowledge.

Looking ahead, TVET institutions will be expected to leverage the full potential of AI, so that TVET remains relevant, agile and accessible to all learners. I hope this volume will support that effort and inspire further cooperation within the global TVET community.

Friedrich Huebler — Head of UNESCO-UNEVOC

AI in TVET: Bridging Gaps or Building Walls in Education?

G. Spöttl

This paper demonstrates that it is not sufficient to prepare skilled workers for employability alone when using AI (artificial intelligence). Rather, it is the responsibility of vocational education and training to clarify what is required in the age of AI to ensure that those people/workers are purposefully taught how to use AI in their professional lives.

With the purpose of showing how digital media and AI can be used to make vocational education and training the subject of learning in terms of content and skills, the chapter on ethical issues and the development of AI contains a fundamental discussion. This leads to the recommendation to develop literacy frameworks for vocational education and training based on work processes, which are understood as a framework for curriculum development. With regard to vocational education and training, it is therefore emphasized that technology-related frameworks fall short and must be expanded to include both work and environmental dimensions.

1 Introduction

In the context of digitalization, work organization and work-processes, the learning process will adapt alongside ongoing automation and real-time control of production and society. The same is true of work content and the interaction and communication between humans and machines, which have many consequences for users and providers throughout technical vocational education and training (TVET).

As conveyed in the opening lines of this paper, the idea that basic machines, which are used, controlled, and operated by humans, will no longer dominate the workplace but rather highly complex systems, equipped with various intelligent technologies, will eventually overcome the Fordist production regime. Innovation, flexibility, and adaptability in production are at the forefront. The scientific approach to these areas not only develops technology further, resulting in significant changes to work in industry and craft, but also reproduces social insights, connections, behaviors, and ways of living. It is therefore understandable why demands are summarized in the assertion that 'the human must retain control' [01, p. 15].

The importance of this demand is underpinned by the position of the Council of the European Union (CEU). It states that our world is entering the digital age, "with current technological advances rapidly changing our current lives and our outlook for the future. Streaming services, carpooling apps, smart homes and personalized healthcare are already with us. Artificial intelligence (AI) is changing every single aspect of our lives." [02, p. 2] The Council assumes that AI will not only revolutionize education,