AI and Its Use in Educating Students in Occupational Health and Safety (OHS) within the Dual VET System in Slovakia

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Abstract

Occupational health and safety (OHS) represents a key component of vocational education and training, particularly in the dual VET system, which links theoretical instruction in school with practical training at the employer's workplace. This paper analyses the implementation of OHS principles in Slovak vocational schools, focusing on the legislative framework, stakeholders' responsibilities, and the integration of OHS content into teaching. OHS education plays an essential role in preventing accidents, fostering responsible work behaviour, and building a culture of safety among future professionals.

The paper also examines emerging opportunities for using artificial intelligence (AI) to modernise and enhance OHS training. AI-supported tools – such as adaptive learning systems, automated knowledge assessment, predictive analytics for risk identification, and VR/AR simulations – enable personalised learning, safe practice of high-risk scenarios, and more efficient fulfilment of safety requirements for both schools and employers. These technologies can significantly improve students' understanding of OHS principles and increase the effectiveness of dual VET.

Although a standalone OHS subject is not commonly included in Slovak vocational school curricula, OHS content is typically incorporated into vocational subjects or delivered through thematic units and mandatory training. Effective implementation of OHS principles requires

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close cooperation between the school, employer, and student, contributing to safer learning conditions and better preparation of graduates for the labour market.

Keywords: Occupational Health and Safety (OHS), Artificial Intelligence, Dual VET, Vocational Schools, Legislation

1 Introduction

The dual VET system is based on linking theoretical instruction at school with practical training directly at the employer's workplace (Madzinová, 2018; Krásna, Barnová, & Gabriš, 2019), where students perform various work-related tasks that may involve risks of injury or threats to their health. This results in high demands on ensuring safe working conditions for students. Occupational Health and Safety (OHS) is an integral part of vocational education and training – not only in terms of creating a safe environment for students during theoretical instruction and practical training, but also in developing work habits that students will apply in future employment (Lajčin et al., 2020). Moreover, implementing OHS principles in dual VET is not merely a legal obligation, but above all a crucial tool for fostering students' responsible attitudes toward work, preventing injuries, and building work habits aligned with the principles of a safety culture, mainly because students are being trained for professions that inherently involve certain risks.

When implementing knowledge associated with the field of occupational health and safety, several requirements emerge. First of all, a practical application of OHS principles within the dual VET system requires close cooperation among all involved parties – the school, employers, and students. A key role is played by coordination between theoretical training, which focuses on recognising risks, understanding safety rules and legal regulations (delivered within specific vocational subjects or taught as a separate subject), and practical training, where students apply these principles in real work environments. High-quality OHS education contributes not only to student health and safety but also to enhancing the quality of vocational training, improving graduates' readiness for labour market requirements, and fostering responsible behaviour among all stakeholders.

2 Legislation Related to Occupational Health and Safety

The legislative framework governing OHS in Slovakia comprises several legal acts that define the responsibilities of employers, schools, students, and other stakeholders. These regulations aim to ensure that vocational school students – whether participating in the dual VET system or not – are trained in safe, health-preserving environments and are not at risk of injury or damage to their health. The most significant regulations include:

1. Act No. 124/2006 Coll. on occupational health and safety and on amendments and supplements to certain acts, which is the fundamental OHS regulation. It outlines employer and employee duties, OHS training requirements, risk prevention principles, and safety responsibilities during practical training.
2. Act No. 355/2007 Coll. on protection and development of public health and on the change and supplement to some acts as amended by subsequent provisions specifies obligations related to workplace health protection, including workplace environment evaluation and provision of protective equipment.
3. Act No. 311/2001 Labour Code regulates safe working conditions for employees and students in practical training, including special provisions for young workers.
4. Act No. 61/2015 on vocational education and training and on the change and supplement to some acts, is crucial for all VET schools, as it requires OHS and fire safety (FS) training before students begin practical training as well as ensuring compliance throughout the training period.
5. Act No. 314/2001 Coll. on fire protection as amended, requiring schools to maintain fire safety documentation, provide training, and conduct evacuation drills.
6. Decree No. 147/2013 Coll. on ensuring safety and health protection during construction work and related tasks, and on qualifications for certain job activities, which specifies safety requirements for construction-related activities – these are also relevant for dual VET training, school workshops, and specialised classrooms.
7. Decree No. 223/2022 Coll. on primary schools, which defines the principal's responsibilities for student safety and accident reporting.
8. Decree No. 224/2022 Coll. on secondary schools and its amendments, which references OHS only indirectly in § 5.
9. Government regulation no. 395/2006 Coll. on minimum requirements for the provision and use of personal protective equipment at work, specifying minimum workplace safety standards, including lighting, temperature, noise, ergonomics, and protective equipment – with a special focus on young workers and students.

3 OHS in the Dual VET System in Slovakia

Despite OHS being a mandated component of vocational training, there is no dedicated compulsory subject titled "OHS" across all vocational fields. Nonetheless, schools may include it within their curriculum using discretionary hours. In practice, OHS is frequently integrated into vocational subjects, structured as a thematic module, or delivered in blocks. In some study programmes (e.g., technical, electrical, construction, chemical, medical), it is a separate thematic unit with its own assessment.

A significant advancement in this area is the introduction of the study programme 3965 M Occupational Health and Safety, included among specialised technical programmes (Decree No. 287/2022 Coll. on the system of fields of education for secondary schools and on the

material scope of application to the fields of education), which prepares students for OHS positions in industrial settings (Vančo & Zemánková, 2025).
Theoretical OHS instruction focuses on legal and organisational foundations, risk recognition, employee rights and duties, labour relations, legislation, injury prevention, ergonomics, and environmental protection. Practical training includes safe work procedures, use of protective equipment, machine and tool handling, fire safety, and prevention measures.
For dual VET students, OHS training is tailored to the employer's workplace conditions, including communication with responsible persons and OHS documentation. Employers must provide initial and recurring OHS and FS training, maintain training records, and ensure professional supervision of student activities.

4 Potentials of AI in OHS within the Dual VET System

In recent years, AI-based technologies have increasingly influenced education (Adel, 2024). Artificial intelligence, now a standard part of modern schooling, can also be meaningfully applied to OHS training. It provides opportunities to modernise and streamline the educational process (Shen et al., 2024) while helping schools and employers mitigate risks associated with practical training in the dual VET system.
AI's potential lies in its ability to analyse large datasets, predict hazardous situations (Fiegler-Rudol et al., 2025), personalise learning, and support prevention. Its implementation can significantly enhance student safety by making OHS content more accessible and engaging, while also supporting institutions in fulfilling legal obligations and strengthening safety culture.
AI-based solutions can support OHS in several areas:

- AI can monitor all students' training processes, including compliance with safety procedures and tracking injuries or training records, as well as student behaviour (Çela et al., 2025).
- Educational tools, such as adaptive learning platforms (Prasetya et al., 2025), VR/AR simulations of hazardous scenarios, and intelligent testing systems that provide instant feedback can increase the quality of training and make it more appealing to students.
- Workplace safety technologies, including IoT sensors that monitor environmental factors (temperature, noise, pollutants), detect dangerous patterns in student behaviour, and provide early warnings, can increase safety as well.

5 Conclusion

Occupational Health and Safety is an essential component of vocational education and training in vocational schools (Gabrhelová et al., 2020). In dual VET, where practical training takes place directly at employers' workplaces, compliance with OHS standards is even more

critical. Its implementation is indispensable for preventing injuries, protecting student health, and developing safe work habits among future employees.

Ensuring effective OHS requires close collaboration among schools, employers, and students to connect theoretical learning with workplace reality. Legislative requirements must be accompanied by systematic integration of OHS into the educational process, continuous monitoring, and regular updates of training content. Introducing a dedicated OHS subject could further improve safety and the quality of vocational preparation.

In this context, emerging technologies – particularly artificial intelligence – offer additional opportunities to strengthen OHS education. AI-supported tools, including adaptive learning systems, automated assessment mechanisms, predictive analytics for identifying risk factors, and immersive VR/AR simulations, can personalise instruction, enable safe practice of high-risk scenarios, and support schools and employers in efficiently meeting safety requirements. These innovations can enhance students' understanding of OHS principles and improve the effectiveness of dual VET.

Ultimately, high-quality OHS training – especially within dual education – is an investment in protecting health, improving workplace culture, and preparing graduates for the demands of the labour market.

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