



Implementation of electronic document management in the occupational safety management system: Modern approaches to the training of future professional education specialists

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Abstract. The management processes digitalisation is essential for improving the efficiency of professional activities in various fields, including occupational health and safety. The introduction of electronic document management (EDM) in the occupational health and safety management system facilitates the optimisation of document flow, increases the level of information security, reduces the influence of the human factor and ensures continuous monitoring of compliance with legal requirements. The purpose of the study concerned analysing the possibilities of implementing electronic document management in the field of occupational health and safety and vocational education, identifying key digital tools for its implementation, and assessing their impact on the efficiency of management processes. For achieving this goal, a set of complementary research methods was used: theoretical analysis, synthesis and generalisation of scientific sources, educational and methodological and regulatory and legal documentation; modeling of the digital technologies integration into curricula; empirical methods (educational programs analysis, teachers' pedagogical activities observation) to assess the peculiarities of EDM implementation in the training of future vocational education specialists. The study examined modern digital technologies and software solutions for document management automation that can be integrated into the educational process. The key advantages of using EDM are identified, including: increasing the efficiency of document flow, reducing the cost of paper resources, ensuring data availability, improving control over compliance with regulatory requirements and minimizing the risks of information threats. The author substantiated the need to update educational programs through the introduction of training modules covering both the technical aspects of working with digital platforms and the legal basis of electronic document management. The prospects for further improvement of the educational process by integrating digital competencies into the training of future vocational teachers (occupational safety and health) are substantiated. The results of the study can be used to modernise educational programs, train specialists in occupational safety and health, optimise management processes in educational institutions and improve the efficiency of documentary support for professional activities

Keywords: digital document science; management process automation; information security; remote administration; educational digital resources; document flow optimisation

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Introduction

Modern digitalisation requires management processes modernisation in all areas of activity, including occupational health and safety. Traditional approaches to documenting and monitoring compliance with regulatory requirements are often ineffective due to the large volume of paperwork, the complexity of its processing and storage, and the risks of data loss or distortion. The use of electronic document management (EDM) allows you to optimise management processes, increase information security, and ensure continuous monitoring of compliance with legal requirements. Furthermore, there is a growing need to train vocational education specialists who have modern digital tools and competencies necessary for the effective implementation of EDM in the occupational health and safety management system. This requires changes in educational programs, the inclusion of practical cases on the use of EDM and the development of professional competencies.

Many scholars have been engaged in research in the field of document management digitalisation. E.L. Baturin *et al.* (2020) considered information technology in electronic document management and emphasised the importance of using electronic keys to identify users and increase data security. O.M. Anisimova (2020) analysed the culture of documents preparation and processing, focusing on the need to standardise digital processes in document management. Particular attention was paid to the formation of employees' digital competence, which includes not only technical skills, but also knowledge of regulatory requirements, business communication ethics and information security rules. O.M. Anisimova (2020) also emphasised the role of document culture in ensuring the management processes quality in the digital environment.

Ye. Goncharenko (2023) researched modern models of development and implementation of EDM systems, noting their effectiveness in simplifying administrative procedures. The author emphasised the importance of proper integration of such systems into business processes and technologies that increase the document management efficiency. It is important for occupational health and safety management, as such systems can optimise workflow and reduce time and resources spent on processing safety-related documents.

Aspects of the EDM application in the field of occupational health and safety were considered by I.V. Hoshovska (2023), who emphasised the relevance of automating management processes to reduce risks and improve safety monitoring at enterprises. Similar conclusions are drawn by K.V. Khizhnyak (2024), highlighting the importance of regulatory support for the introduction of EDM in the occupational safety and health management system. T. Korolyuk & N. Rapa (2021) analysed the advantages and disadvantages of document management digitalisation, paying attention to the legislative aspects and the effectiveness of such systems implementation in

various fields of activity. G.P. Lukash (2020) studied the concept of a document in document science and noted the multiparadigm approach to defining its essence, which is relevant in the context of digital transformations. G.P. Lukash (2020) focuses on the concept of document evolution in the digitalisation context, when the traditional material form gives way to virtual media, which does not reduce, but rather complicates its analysis. The author also draws attention to institutional and technological changes that force to revise the basic theoretical provisions of document studies.

The study of the relevance of electronic document management in the occupational health and safety management system is important and timely, since it not only contributes to improving the efficiency of production processes but also forms a new level of training for future specialists in this field. The purpose of the article is to substantiate the need to introduce electronic document management into the occupational health and safety management system and the process of training future vocational teachers (occupational health and safety), to identify its key advantages, modern software solutions and prospects for application.

For achieving this goal, the following tasks are envisaged: to study the current state of electronic document management implementation in the occupational health and safety management system in Ukraine, as well as to analyse modern EDM software; to develop methodological recommendations for integrating electronic document management into educational programs for training vocational teachers (occupational health and safety), as well as to identify the main challenges and prospects for its implementation; to propose a model for implementing electronic document management in the occupational health and safety management system

The research scientific novelty consists in an integrated approach to the study of the electronic document management system implementation in the occupational health and safety management system with an emphasis on its integration into the process of training future vocational teachers (occupational health and safety).

Materials and Methods

The research used a set of theoretical and empirical methods that allow to comprehensively reveal the problem of introducing electronic document management into the occupational safety and health management system and the educational process. Methods of scientific cognition: theoretical analysis – study of scientific, methodological and normative legal sources to determine the essence of electronic document management, its importance in modern management and educational activities; comparative analysis – study of the digitalisation of document management experience in Ukraine in order to identify best practices and opportunities for their adaptation; analysis of normative legal acts – consideration

of the current legislative framework governing the introduction of electronic document management; content analysis – research of information resources, reports, and publications on electronic document management.

Empirical methods: direct and indirect observation – analysis of the practice of implementing electronic document management in educational institutions and enterprises; review of modern information systems – analysis of available software solutions for electronic document management, including M.E.Doc, Vchasno, Document.Online, Microsoft SharePoint, Google Workspace, etc. (Electronic document management, n.d.); analysis of teachers' pedagogical activities – study of future specialists' training methods, the level of digital technologies integration into the educational process.

The actual material of the study was based on the legal acts of Ukraine, namely: Law of Ukraine No. 851-IV "On Electronic Documents and Electronic Documents Circulation" (2003) – articles on the definition of an electronic document, its legal status and storage requirements were analysed; Law of Ukraine No. 2155-VIII "On Electronic Trust Services" (2017) – provisions on electronic signatures and certification centers were considered; Order of the Ministry of Justice of Ukraine No. 1886/5 (2014) – examined the requirements for electronic document management in organisations; Resolution of the Cabinet of Ministers of Ukraine No. 55 (2018) – studied the requirements for electronic interagency exchange; Order of the Ministry of Economy of Ukraine No. 839-21 (2021) – analysed the provisions on the use of digital solutions in the field of occupational health and safety.

The article presents an analysis of the educational and professional program "Vocational Education (Occupational Health and Safety)" of the first (bachelor's) level of higher education in the specialty 015 Vocational Education (Occupational Health and Safety) of the field of knowledge 01 Education / Pedagogy. (2024) (Educational and Professional Program ..., 2024) at the Hryhorii Skovoroda University in Pereiaslav and the Standard of Higher Education, first (bachelor's) level, 015 "Vocational Education (by specialisations)" (Order of the Ministry of Education and Science of Ukraine No. 1460, 2019).

This paper considered scientific research and publications that provide practical recommendations for the implementation of electronic document management in occupational safety and health management systems (State labor service of Ukraine, 2024), elaborates on modern models and methods of creating and implementing EDM (Goncharenko, 2023), provides an analysis of the problems and prospects of electronic document management in the field of occupational safety and health (Hoshovska, 2023), examined the features of the functioning of electronic document management systems in the field of occupational safety (Khizhnyak, 2023), studied practical advice on the implementation of EDM in the occupational safety management system (Khizhnyak, 2024) and analysed

the benefits of EDM in occupational safety management (What are the benefits... 2023).

Results and Discussion

The electronic document management system in the field of occupational safety and health is a technological document management system based on digital information technologies and automated data processing. Its implementation helps to improve the efficiency of management decisions, ensure the transparency of production processes and create a safe working environment. In the context of training future vocational education specialists, EDM is an important element in the formation of their digital competencies necessary to work in the modern technological environment.

The digitalisation of occupational health and safety management using EDM provides: optimisation of documentary support for the occupational health and safety process, which allows to reduce the volume of paper documents, reduce the cost of their administration and accelerate information exchange between the subjects of supervisory activities; prompt access to the regulatory framework, which allows specialists and officials to quickly receive the necessary instructions, orders and protocols in electronic form; control and reporting processes automation, which contributes to timely monitoring of occupational safety, risk identification and reasonable management decisions; increasing the level of information security through the use of digital signatures, cryptographic protection and automated document access control systems (Hoshovska, 2023; What are the benefits..., 2023).

A key aspect of integrating EDM into the educational process is to prepare future professionals to work in a digital document environment (Semenenko, 2024). This implies mastering the skills of working with modern document management systems, knowledge of regulatory requirements for EDM in the field of occupational safety and health, as well as the ability to analyse and use information in digital formats to ensure the effective functioning of the occupational safety and health system at enterprises. Consequently, the introduction of electronic document management not only optimises occupational health and safety management at enterprises, but also requires appropriate changes in the vocational education system aimed at training specialists who are proficient in modern information technologies and are able to apply them in the field of occupational safety.

The main advantages of implementing electronic document management in the occupational health and safety management system and its role in training future vocational education specialists

Scientific papers analysis (Hoshovska, 2023; Kamenka *et al.*, 2023; Baturin *et al.*, 2020), studies on the benefits of electronic document management in the occupational safety management system – What are

the benefits of electronic document management in the occupational safety management system? (2023), as well as regulatory documents – State labor service of Ukraine (2024); Order of the Ministry of Justice of Ukraine No. 1886/5 (2014); Resolution of the Cabinet of Ministers of Ukraine No. 55 (2018); Order of the Ministry of Economy of Ukraine No. 839-21 (2021), etc. leads to the conclusion that the introduction of EDM into the occupational safety management system is an important step in the digital transformation of production and educational processes. It helps to increase the efficiency of administration, minimise paperwork and optimise information flows. In addition, the integration of EDM into the educational process forms the digital competencies of future vocational education specialists, which is a key aspect of their professional training.

Within the educational component “Supervisory Activity Organisation in the Field of Occupational Safety and Health”, it is of particular importance that future specialists master the skills of using electronic document management. This ensures the training of competitive specialists who are able to work in the context of digital transformation and effectively apply modern information technologies in their professional activities (Kamenska, 2023).

The EDM integration into the educational process would help students develop a number of important competencies. In particular, they would be able to effectively use modern information technologies and specialised software to automate occupational health and safety management processes, which would facilitate their integration into the educational environment of vocational education. At the same time, students would be able to apply appropriate software to solve tasks in the field of occupational safety and health according to the requirements of professional activity and specialisation. Considerable attention would be paid to the development of skills to carry out professional activities in compliance with the requirements of occupational health and safety legislation, educational standards and internal regulations of the educational institution. Students would also learn methods of organizing work in the context of digitalisation, taking into account the requirements of environmental safety, life safety, occupational health and safety (Order of the Ministry of Education and Science of Ukraine No. 1460, 2019). In addition, future specialists would acquire competencies in the field of digital document management technologies, analysis and use of regulatory documents in digital format. Mastering the skills of working with electronic signatures, digital registers and automated security control systems would be an important part of their training. At the same time, it would also become important to understand the modern requirements for the digitalisation of management processes in the field of occupational safety and health, which would help to improve their professional training and meet the current challenges of their professional activities.

Meanwhile, despite the considerable attention of researchers to the issues of document management digitalisation and management process automation, the aspects of EDM integration into the training of future vocational teachers (occupational health and safety) are not sufficiently considered. This necessitates a thorough analysis of modern digital technologies and their impact on the development of relevant competencies in future teachers. The introduction of EDM into the educational process is therefore an important step in the training of specialists who are able to work in the context of digital transformation and effectively use modern information technologies in their professional activities.

The authors identify the main advantages and challenges associated with the implementation of EDM in this area:

- ✓ optimisation of document flow and reduction of time for processing documents – the EDM implementation can significantly reduce the time for creating, approving, transferring and archiving documents. For example, while traditional document flow can take several hours or days, when using an EDM, the transfer of documents between structural units is instantaneous. This is especially important for rapid response to emergencies, reporting on occupational safety, and monitoring the implementation of instructions (Hoshovska, 2023; Khizhnyak, 2024);

- ✓ convenience, mobility and remote work – digital EDM platforms provide access to documentation from any geographical location, which greatly simplifies occupational health and safety management in the context of decentralised work of enterprises or educational institutions. In addition, this is an important factor in the context of pandemics, military operations and other emergencies when it is necessary to quickly adapt to new operating conditions (Khizhnyak, 2023; State labor service of Ukraine, 2024);

- ✓ resource saving and material cost reduction – the transition to EDM can significantly reduce the cost of paper, print cartridges, archival storage and physical delivery of documents. It is estimated that about 60% of paper copies of documents lose their relevance within one business day. The use of digital technologies reduces the amount of unnecessary printed materials, contributing to the environmental sustainability of an enterprise or institution (The future of occupational safety..., 2023; What are the benefits..., 2023);

- ✓ increasing the level of control over compliance with occupational health and safety standards – digital EDM platforms provide automated monitoring of changes in regulations, control over the implementation of occupational health and safety measures, preservation of the history of changes made, and centralised access to the necessary documentation. This allows managers to quickly assess the current state of the occupational health and safety system and respond to violations in a timely manner (Order of the Ministry of Economy of Ukraine No. 839-21, 2021; Khizhnyak, 2023);

✓ routine processes automation and increased management efficiency – the use of modern EDM systems allows automating a number of administrative processes, including the approval of internal documentation, maintaining electronic briefing logs, managing personnel certification and organizing internal audits. This significantly reduces the risks associated with the human factor and ensures the continuity of occupational health and safety management processes (Kamenska *et al.*, 2023; What are the benefits..., 2023);

✓ reliability and security of document storage – electronic documents are stored on secure servers using modern cryptographic encryption methods. This guarantees protection against unauthorised access, loss or damage to documents. In addition, all operations with documents can be tracked through audit systems, which ensures high transparency of occupational health and safety management processes (Order of the Ministry of Justice of Ukraine No. 1886/5, 2014; State labor service of Ukraine, 2024);

✓ optimisation of normative legal support – the introduction of EDM simplifies the work with the regulatory framework governing occupational health and safety. Thanks to the automatic updating of legislative acts and quick search for the necessary documents, enterprises can quickly adapt to changes in legislation and ensure compliance with the requirements of the Regulatory legal acts on occupational health and safety (Resolution of the Cabinet of Ministers of Ukraine No. 55, 2018; Hoshovska, 2023);

✓ environmental aspect of EDM implementation – refusal to use paper media helps to conserve natural resources, reduce paper recycling costs and reduce plastic waste. This is in line with modern environmental standards and sustainable development policy (Baturin *et al.*, 2020; What are the benefits..., 2023);

✓ increasing the level of interaction between customers and contractors – thanks to digital platforms, companies can coordinate cooperation with contractors faster and more efficiently. This applies to both the prompt approval of technical documentation and contractual activities in the field of labor protection (The future of occupational safety..., 2023; Goncharenko, 2023);

✓ digital competencies formation in future vocational education specialists – the use of EDM in the educational process contributes to the development of key skills required by a modern specialist in occupational safety and health and production process management. Future specialists learn to work with digital document management systems, which allows them to adapt to the requirements of the labor market and effectively imple-

ment the latest management practices in their professional activities (Hoshovska, 2023; Kamenska *et al.*, 2023).

The electronic document management system implementation in the occupational health and safety management system not only ensures technological modernisation of processes, but also contributes to their efficiency, transparency and compliance with modern requirements. Key benefits include optimisation of time and resources, increased control and safety, accessibility and mobility, as well as environmental and educational aspects. At the same time, the implementation of EDM requires overcoming a number of challenges related to technical infrastructure, legal aspects, data protection, and the development of digital competencies among employees. Consequently, the successful implementation of electronic document management in the field of occupational health and safety requires a comprehensive approach that combines organisational, technical and educational components.

Electronic document management integration into the educational process in the training of future occupational health and safety specialists

The electronic document management integration into the occupational health and safety management system not only increases the efficiency of management processes but also ensures the development of key competencies in future vocational education specialists. Automation, digitalisation, and remote access to documents create prerequisites for improving control over compliance with safety standards, simplifying learning processes, and reducing the cost of material resources (Borodiyenko *et al.*, 2023). Therefore, the use of EDM is a strategically important area of development of a modern enterprise and the educational process, which contributes to the training of qualified specialists who are able to work effectively in the digital economy.

The implementation of EDM in the occupational health and safety management system requires appropriate training of future specialists, including vocational teachers (occupational health and safety). An important task is to ensure effective training in the methods of working with electronic systems, the use of practice-oriented approaches and the adaptation of the content of educational programs to digital technologies. In order to develop digital competencies in the field of occupational safety and health among higher education students, it is advisable to use modern teaching methods that facilitate the integration of electronic document management into the educational process (Table 1).

Table 1. Teaching methods for the development of digital competencies in the field of occupational safety and health

Teaching method	Description
Project-based learning	Students perform tasks related to the development and implementation of electronic document management systems at enterprises. This approach helps to develop practical skills in working with digital platforms.

Teaching method	Description
Professional situations modeling	Students practice algorithms for creating, signing, archiving and controlling electronic documents according to normative and legal requirements
Problem-based learning	Students analyse the real challenges associated with the introduction of EDM in the occupational health and safety system and develop optimal solutions
Interactive teaching methods	Students use specialised software products, cloud services, and learning management systems (LMS) that provide quick access to training materials and practical tasks

Source: authors' own analysis based on researches of O. Harbych-Moshora, (2018); E.L. Baturin *et al.* (2020); O. Fedoruk (2021); Ye. Goncharenko (2023); I.V. Hoshovska (2023); K.V. Khizhnyak (2023); A.S. Ovsyenko & M.V. Dubovchuk (2024)

Considerable potential in the training of future vocational teachers in occupational safety and health is provided by the use of the case method and simulation technologies (Wahyuni *et al.*, 2024). Practical cases allow to consider real scenarios of EDM implementation, in particular: analysis of the enterprises' experience using digital document management systems (for example: "M.E.Doc" (Saraswat *et al.*, 2024), "Vchasno", "Document.Online", etc.); students performing practical tasks on processing electronic documentation, including creating, signing, transferring and storing documents according to regulatory requirements; using simulations to work out critical situations that may arise during electronic document management (for example, detecting violations, checking compliance with regulations, risk management).

Software for electronic document management in occupational health and safety and the educational process

Modern digital platforms are used to ensure the effective functioning of electronic document management in the field of occupational safety and health and to train future specialists. They facilitate automation of document management processes, increase transparency and

control over compliance with regulatory requirements, and provide quick access to the necessary information. The electronic document management systems presented in Table 2 differ in their functionality and approaches to automating document management in the field of occupational health and safety. For example, M.E.Doc facilitates the official exchange of documents between businesses and government agencies, which is critical for regulatory activities. VCHASNO.EDO and Document.Online offer effective cloud-based solutions for automating internal processes of enterprises, enabling quick approval and signing of documents. Solutions such as Microsoft SharePoint and BAS Document Management are focused on corporate document management and integration with other digital platforms, which facilitates control over compliance with regulatory requirements in the field of occupational health and safety. Google Workspace cloud services contribute to the creation of a unified information ecosystem for educational institutions and enterprises, ensuring effective interaction between employees and students. At the same time, the Megapolis.DocNet is a popular system in the public sector, which guarantees centralised control over the implementation of labor safety requirements (Electronic document management, n.d.).

Table 2. Overview of digital platforms for electronic document management in the field of occupational health and safety

No.	Platform name	Main functions	Use in the field of labor protection	Features and benefits
1.	M.E.Doc	Document exchange, reporting, integration with government agencies	Regulatory reports submission, document flow automation	Minimises errors, digital archive
2.	VCHASNO.EDO	Cloud storage, electronic signature, document status control	Operational documents exchange between employees	Flexible access from any device
3.	Document.Online	Automate document exchange, signing, and storage	Digital competencies development, management transparency	Centralised storage, changes history
4.	Microsoft SharePoint	File collaboration, electronic archives, integration with Microsoft 365	Access to instructions, reports, task performance monitoring	Integration with corporate services
5.	BAS Document Management	Management process automation, normative acts control	Documents structuring, approval routes	Analytics and reporting functionality
6.	Google Workspace	Cloud storage, Google Docs, Forms, Drive	Regulatory documents creation and editing, knowledge testing	Easy access, integration with other Google services
7.	Megapolis.DocNet	Compliance control, unified document registry	Automated control of occupational safety and health	Documents status tracking in real time

Source: authors' compilation based on the catalog of systems and programs for business from Electronic document management (n.d.)

To summarise, M.E.Doc, BAS Document Management, and Microsoft SharePoint are most effective for large organisations with complex document management structures and high integration and security requirements. Meanwhile, VCHASNO.EDO, Document. Online, and Google Workspace are the best for small and medium-sized enterprises or teams working remotely, as they provide convenient access and ease of use. The Megapolis.DocNet is very effective for companies that need specific control over occupational safety and health, but its functionality may be too narrow for general use in other areas. The software choice depends on the specifics of the enterprise or educational institution, the digitalisation level and the need for integration with other information systems. Consequently, the introduction of electronic document management into the occupational health and safety management system not only contributes to the efficiency of safety process administration, but also becomes an integral part of the training of future vocational teachers. The integration of digital technologies into the educational process allows to form competent specialists who are able to effectively use modern automation tools in their professional activities.

Taking into account that the discipline "Supervisory Activity Organisation in the Field of Occupational Health and Safety" is one of the key disciplines in the training of future occupational health and safety teachers, it is necessary to integrate the issues of digital transformation of documentary processes into its content. The main areas of adaptation are: supplementing the educational content with modules covering the peculiarities of legal regulation of EDM in the field of occupational safety and health, standards of digital signature and electronic archiving of documents; introduction of laboratory classes using real software platforms used in industry for electronic document management; digital competencies development of teachers who train future vocational teachers in occupational health and safety through their involvement in trainings and educational programs on the use of digital technologies in professional activities (Wahyuni *et al.*, 2024).

The implementation of modern digital platforms for electronic document management in the occupational health and safety management system is an important condition for improving the efficiency of administrative processes, compliance with regulatory requirements and ensuring information transparency. The relevance of their use is also growing in the context of training future specialists, in particular, vocational teachers of occupational safety and health, for whom digital competencies are of key importance. Integration of electronic document management into the content of professional training, focused on legal regulation, practical application of software products and development of digital literacy, contributes to the formation of the ability to function effectively in the context of digital transformation of the production environment.

Methodological recommendations for the integration of EDM issues into the training programs of future vocational teachers in occupational safety and health

The authors suggest methodological recommendations for the integration of electronic document management into the educational programs of training future teachers of vocational training in occupational safety and health, which would contribute to the formation of students' digital competencies and the effective use of modern information technologies in professional activities:

1. Introduction of the subject of EDM into educational programs (introduction of a separate module or topic within the disciplines "Fundamentals of Occupational Health and Safety", "Organisation of Supervisory Activities in the Field of Occupational Health and Safety", "Modern Information Technologies", "Modern Technologies of Distance Education", "Information Technologies in the System of Vocational Education", etc.; coverage of regulatory and legal aspects of EDM implementation in the field of occupational health and safety).

2. Use of a practice-oriented approach (conducting trainings and workshops using real EDM programs (M.E.Doc, "Vchasno", document management in Moodle, Google Workspace, etc.); organisation of case methods based on real examples from enterprises).

3. Formation of digital competencies (familiarisation with digital signatures, cloud-based document storage and processing services; training in the principles of information security in working with electronic documents).

4. Use of blended and distance learning technologies (use of e-learning platforms to model the document management process; students performing practical tasks through online EDM systems).

5. EDM integration into pedagogical practice (creation of an electronic portfolio of students with examples of working documentation on occupational safety and health; introduction of self-study and microlearning methods for advanced training in EDM).

These recommendations would contribute to the formation of professional competencies of future vocational teachers and ensure their ability to effectively apply modern technologies of electronic document management in the field of occupational safety and health and in professional teaching.

Prospects and challenges of implementing electronic document management in the training of vocational teachers in occupational safety and health

The electronic document management (EDM) implementation in the occupational health and safety management system is one of the key areas of digital transformation of professional activities. This requires an appropriate level of training for future occupational health and safety teachers, which requires adaptation of the educational process. However, the process of integrating digital technologies into

curricula is accompanied by a number of challenges that require a comprehensive analysis and development of effective solutions.

Despite the obvious advantages of electronic document management, its implementation in the educational process of training future occupational health and safety vocational teachers faces a number of problems, namely: insufficient level of digital literacy – some students and teachers do not have the necessary skills to work with electronic document management systems, which complicates their integration into the educational process; lack of unified standards for EDM training – educational programs do not always contain systemic modules aimed at developing competencies in the field of digital document management, which leads to fragmentation of knowledge of higher education students; limited access to specialised software – educational institutions do not often have the opportunity to use modern digital platforms for students' practical training, which reduces the learning efficiency; legal and organisational barriers – the EDM implementation is regulated by a number of normative acts, compliance with which requires special training. The lack of training materials covering the legal aspects of EDM may result in an incomplete understanding of legal requirements by future professionals; resistance to change – traditional methods of record keeping remain dominant in many educational institutions and businesses, making it difficult to transition to digital technologies.

Consequently, taking into account the main problems of electronic document management implementation and its use, it is necessary to realise a set of measures to improve the educational process in order to ensure high-quality training of future vocational teachers in occupational safety and health, capable of effectively using electronic document management in the field of occupational safety and health, namely: development of specialised training modules on electronic document management that would cover both the technical aspects of working with digital platforms and the legal norms for regulating document management in the field of occupational safety and health; introduction of practical training using real electronic document management systems, which would allow students to gain experience with the relevant software; teachers' digital competence

development by conducting seminars, webinars and certification courses on modern document management technologies and their implementation in professional activities; interactive educational platforms creation and distance learning implementation, which would facilitate the flexibility of the educational process and increase the availability of educational resources; electronic document management integration into educational components through project-based and problem-based learning methods, which would allow students to solve real-world problems in the field of occupational safety and health; expanding cooperation between educational institutions and enterprises, which would facilitate the creation of practice bases for students using digital document management technologies.

In addition, an important step in the training of future occupational health and safety professionals is access to relevant professional publications. One such source is the periodical electronic publication "Expertus: Occupational Safety & Health" (Expertus..., n.d.), which contains analytical materials, practical recommendations and regulatory updates in the field of occupational safety and health. Subscription to this publication would provide students and teachers with the opportunity to receive the latest information on legislative changes, modern methods of occupational safety management and best practices in the use of electronic document management in this area. This would help to improve their professional training and integrate digital technologies into the educational process.

Visualisation of the model for implementing electronic document management in the system of occupational safety management and training of future vocational education specialists

The authors have distinguished a model for the electronic document management system implementation in the occupational health and safety management system and training of future vocational teachers (occupational health and safety). The development of the model (Table 3) would allow structuring the process of introducing EDM into the occupational health and safety management system and identifying the key stages of training future vocational teachers (occupational health and safety).

Table 3. Model of electronic document management implementation in the system of occupational health and safety management and training of future vocational education specialists

Conceptual basis			
Optimisation of occupational health and safety management processes through the introduction of EDM and training of future vocational teachers in its use			
Principles			
Digitalisation	Modern technologies integration	Interdisciplinary approach	Competence-based approach
Structural components			
Organisational component (normative and legal framework, staffing)	Educational component (specialists' training through digital technologies and teaching methods)	Technological component (software tools and EDM infrastructure)	

Structural components		
Determination of the normative and legal framework for the EDM implementation	Updating educational programs in view of digitalisation	Modern learning software usage (M.E.Doc, DocProf, Microsoft SharePoint, etc.)
Technical capabilities and software analysis	Teaching disciplines related to EDM (for example, "Organisation of supervisory activities in the field of occupational safety and health", "Occupational safety and health expertise", "Monitoring of the working environment and certification of workplaces", "State social insurance against accidents, occupational diseases and accidents at work", etc.)	Training simulators integration for working with digital documents
Process participants identification (administration, teachers, students, employers)	Applying practice-oriented teaching methods (case method, simulations, work with real documents)	Cloud technologies usage for document sharing and processing
Evaluation component (performance monitoring and process improvement)		
Monitoring the effectiveness of EDM implementation in the educational process	The higher education students' competence level assessment	Analysis of the results of graduate training at enterprises
Expected results (increased security, management efficiency and digital competencies of specialists)		
Digital competencies development in future vocational teachers	Document flow optimisation in the field of occupational health and safety at enterprises	Improving the specialists' training level according to the digital economy requirements
Higher education applicants certification		
Competitive qualified specialist of a new formation and demanded in the market of educational services		

Source: authors' compilation based on the legal documents of the Law of Ukraine No. 851-IV (2003); Law of Ukraine No. 2155-VIII (2017); Order of the Ministry of Education and Science of Ukraine No. 1460 (2019); Educational and Professional Program... (2024)

The suggested model for implementing electronic document management in the system of occupational safety and health management and training of future vocational teachers is comprehensive and integrative. It covers the conceptual framework, structural components, and expected results that provide a systematic approach to the digital transformation of the industry. Taking into account the interdisciplinary and competency-based approaches, the model allows combining the regulatory, educational and technological components necessary for effective training of specialists. Particular attention is paid to practice-oriented training, the use of modern digital tools, and results monitoring. This ap-

proach contributes not only to the optimisation of management processes in the field of occupational health and safety, but also to the formation of a competitive specialist capable of adapting to the digital economy.

Algorithm for implementing an electronic document management model in the occupational health and safety management system

The offered model of EDM implementation in the occupational health and safety management system provides for the gradual integration of digital technologies into the process of training future vocational teachers (Table 4).

Table 4. Stages of implementation of the model of optimisation of occupational safety and health management through the introduction of EDM and training of future vocational teachers

Key stage	Description
Needs analysis	Study the current state of electronic document management in the field of occupational safety and health, determine regulatory requirements and identify the main challenges associated with the digitalisation of documentary processes.
Educational content development	Developing educational materials containing theoretical and practical aspects of using EDM, including the integration of digital technologies into curricula for training future specialists.
Academic disciplines adaptation	Adapting academic disciplines to meet the requirements of digital document management, including updating course content to reflect the latest methods of electronic document management.
Teachers' training	Ensuring the professional development of vocational teachers by mastering modern electronic document management systems, methods of their implementation in the educational process, and the use of digital tools for effective teaching.
Pilot implementation	Approving electronic document management in the educational process in order to assess the effectiveness of methodological approaches, conducting practical classes using EDM and introducing case studies to develop the professional competencies of higher education students.
Evaluation and adjustment	The implementation results analysis, determining the level of higher education students' digital competencies development, improving educational programs based on the data obtained and feedback from the educational process participants.

Source: authors' compilation based on the scientific papers and regulatory documents analysis of Order of the Ministry of Education and Science of Ukraine No. 1460 (2019); E.D. Wahyuni *et al.* (2024), R. Saraswat, *et al.* (2024); Educational and Professional Program... (2024)

The present algorithm is aimed at improving the quality of professional training of future vocational teachers (occupational safety and health) by integrating modern digital document management technologies. The integration of electronic document management into the training of future vocational teachers in occupational safety and health opens up broad prospects for increasing the efficiency of document management and improving educational activities. However, the realisation of this goal requires a systematic approach that involves removing barriers, improving curricula, and introducing modern digital solutions into the educational process. Optimisation of approaches to training students in the field of electronic document management would ensure that their qualifications meet the current requirements of the labor market and promote the development of a digital culture in the field of occupational safety and health.

The electronic document management implementation in the field of occupational safety and health and in the educational process is a topical issue that is being studied by many researchers. This section compares the results of this study with the works of other authors and identifies common and different approaches. O. Fedoruk (2021) analysed the peculiarities of the introduction of a qualified electronic signature (QES) in educational institutions. The author focuses on the regulatory aspects of the use of QES, its importance for the digital transformation of document management and the need to train educators to work with electronic documents. The study emphasises that the effective use of QES contributes to the security of electronic document management, increases the legal significance of digital documents, and optimises management processes in the field of education. The present study supports these conclusions, as it also emphasises the importance of digitalisation of the educational process and the use of modern electronic tools in the field of occupational health and safety. However, while O. Fedoruk (2021) studied the general aspects of QES in educational institutions, the present study is aimed at training vocational teachers in occupational safety and health and assessing the impact of electronic document management on the effectiveness of occupational safety and health management.

S.M. Tukalo (2021) studied the organisational and pedagogical principles of implementing EDM on the SharePoint platform in scientific institutions. The author developed a model for implementing an EDM system and substantiated the use of a digital portfolio of a researcher. This work also considers the use of modern digital platforms, including Microsoft SharePoint, but this study focuses on their use in the educational process in the training of vocational teachers of occupational safety and health. The difference is that S.M. Tukalo (2021) focused on scientific institutions, while this paper focuses on educational institutions.

V. Hryshyn & L. Filipova (2023) analysed the key trends in the document management systems digitalisation in public authorities, emphasizing the importance of introducing modern information technologies to improve the efficiency of management processes. In their work, the authors emphasise the challenges associated with the adaptation of government agencies to new digital services. Researchers M.O. Vronskiy & I.V. Panchenko (2022) analysed the introduction of EDM in the personnel work of higher education institutions, identified the main problems and features of this process. The authors emphasise the need for organisational changes and staff adaptation to new digital tools. The study confirms these conclusions, as the training of future vocational teachers involves the development of digital competencies for the effective use of EDM. There is a common understanding of the importance of adapting educational programs, but this study focuses on the specifics of occupational safety and health. N. Zakharchenko *et al.* (2017) in their study consider the impact of electronic document management (EDM) on business efficiency. The authors note that the EDM implementation can significantly reduce the time for document processing, reduce errors and increase the efficiency of communication between departments. This is important for occupational health and safety management, as it facilitates information processing and improves management processes at enterprises.

The study by K. Yurchenko (2020) focused on the risks associated with the EDM implementation, in particular, the risks of data loss and unauthorised access to data. The author proposed strategies to minimise these risks, including the use of security systems, backups, and staff training. The author's research is important for occupational health and safety management, as the storage and processing of sensitive information requires a high level of security and reliable data protection mechanisms. I. Zastrozhnikova (2020) studied the conceptual framework of EDM in education, emphasizing its functions, such as reducing time and saving resources. The author notes that EDM in educational institutions contributes to the continuity of document flow and avoidance of duplication. The proposed study confirms these benefits, adding that in the context of occupational health and safety, EDM also contributes to improved safety and control over compliance with regulatory requirements.

Researchers A.S. Ovsyenko & M.V. Dubovchuk (2024) and R. Kravets *et al.* (2023) analysed the EDM implementation in the enterprise management system, paying attention to integration with existing systems and security issues. The authors emphasised that efficient processing of growing amounts of information is possible only if processes are automated. The presented study agrees with this statement, adding that in the educational process, document flow automation contributes to improving the quality of future occupational health and safety specialists' training.

O. Harbych-Moshora (2018) studied the advantages and organisation of EDM systems in higher education institutions, identifying the basic requirements for such systems. The author notes that the EDM integration into the educational process faces certain challenges, such as the need to train staff and adapt to new technologies. This study also points out these challenges, but adds that the use of case studies and simulations can contribute to more effective training and adaptation.

Consequently, the scientific sources analysis shows that there is a general recognition of the EDM implementation importance in the educational process and in the field of occupational safety and health. Common to all studies is the emphasis on the need to adapt educational programs, staff training and integration of modern digital tools. The differences lie in the specifics of the use of EDM in various industries and approaches to its implementation. The present study contributes to this discussion by focusing on the training of vocational teachers in occupational health and safety and proposing a model for the phased EDM implementation in the occupational health and safety management system.

■ Conclusions

The conducted research confirms that the electronic document management implementation in the occupational health and safety management system is an important factor in the modernisation of the educational process of training future vocational teachers in occupational health and safety. The analysis of existing approaches to the integration of digital technologies into education has shown that the EDM use contributes to improving the level of professional competence of higher education students, forming their digital skills and developing analytical thinking.

The main challenges to the effective implementation of EDM are still insufficient digital literacy of teachers and students; lack of unified standards for teaching electronic document management systems; limited access to modern software; organisational and regulatory barriers to the use of digital technologies in the educational process. However, taking appropriate measures would help to overcome these difficulties and create an effective system of training future vocational teachers in occupational safety and health that meets modern digitalisation requirements. Optimizing the training of future vocational specialists in occupational health and safety requires an integrated approach to the electronic document management implementation, which involves its integration into educational programs through the development of relevant training modules, the use of interactive platforms and simulations, and

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the improvement of regulatory support and methodological recommendations.

The electronic document management integration into the educational process is a prerequisite for training competitive vocational specialists. The use of modern teaching methods, practical cases, and simulation technologies contributes to the development of professional competencies of higher education students, allowing them to work effectively with digital systems in their future professional activities. Adaptation of academic disciplines to digital realities ensures that educational programs meet modern labor market requirements and promotes the digital transformation of occupational health and safety management.

Strengthening cooperation between higher education institutions and enterprises, which would allow students to master digital document management technologies in practice, as well as introducing problem-based learning, which would contribute to the formation of analytical thinking and professional competencies, are also important areas. Consequently, the further development of electronic document management in the training of vocational teachers of occupational health and safety would help to improve the quality of the educational process, develop students' modern competencies and ensure their competitiveness in the labor market. The study does not exhaust all aspects of this problem. Prospects for further research in this area would be aimed at studying the impact of electronic document management on the safety of production processes, in particular, analysing the effectiveness of its use at enterprises and assessing its role in reducing production risks.

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**Впровадження електронного документообігу
в систему управління охорони праці:
сучасні підходи у підготовці майбутніх фахівців професійної освіти**

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Анотація. Цифровізація управлінських процесів є важливим чинником підвищення ефективності професійної діяльності в різних сферах, зокрема в охороні праці. Впровадження електронного документообігу (ЕДО) в систему управління охороною праці сприяє оптимізації документообігу, підвищенню рівня інформаційної безпеки, зменшенню впливу людського фактора та забезпеченню безперервного контролю за дотриманням вимог законодавства. Метою дослідження було проаналізувати можливості впровадження електронного документообігу у сфері охорони праці та професійної освіти, визначити ключові цифрові інструменти для його реалізації та оцінити їх вплив на ефективність управлінських процесів. Для досягнення поставленої мети використано комплекс взаємодоповнюючих методів дослідження: теоретичний аналіз, синтез та узагальнення наукових джерел, навчально-методичної та нормативно-правової документації; моделювання інтеграції цифрових технологій у навчальні програми; емпіричні методи (аналіз освітніх програм, спостереження за педагогічною діяльністю викладачів) для оцінки особливостей впровадження ЕДО в підготовку майбутніх фахівців професійної освіти. У дослідженні розглянуто сучасні цифрові технології та програмні рішення для автоматизації документообігу, які можуть бути інтегровані в освітній процес. Визначено ключові переваги використання ЕДО, серед яких: підвищення оперативності документообігу, скорочення витрат на паперові ресурси, забезпечення доступності даних, покращення контролю за дотриманням нормативних вимог і мінімізація ризиків інформаційних загроз. Обґрунтовано необхідність оновлення освітніх програм через впровадження навчальних модулів, що охоплюють як технічні аспекти роботи з цифровими платформами, так і правові основи електронного документообігу. Аргументовано перспективи подальшого вдосконалення освітнього процесу шляхом інтеграції цифрових компетентностей у підготовку майбутніх педагогів професійного навчання (охорона праці). Результати дослідження можуть бути використані для модернізації освітніх програм, підготовки фахівців з охорони праці, оптимізації управлінських процесів у закладах освіти та підвищення ефективності документального супроводу професійної діяльності

Ключові слова: цифрове документознавство; автоматизація управлінських процесів; інформаційна безпека; дистанційне адміністрування; освітні цифрові ресурси; оптимізація документообігу