



Digital transformation in human resource management within the vocational education system

Alla Zlenko*

PhD in Historical Sciences, Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskyi Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0002-5586-3984>

Dmytro Kotsur

PhD in Physical and Mathematical Sciences, Associate Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskyi Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0003-0230-8095>

Yana Zlenko

Lecturer
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskyi Str., Pereiaslav, Ukraine
<https://orcid.org/0009-0001-6052-7897>

■ **Abstract.** This study aimed to analyse the specific features of digital transformation in human resource management within the vocational education system in Ukraine. A quantitative survey method was employed alongside qualitative methods such as cost and benefit analysis and SWOT analysis to achieve this aim. According to the results of the SWOT analysis, digital transformation in human resource management within the vocational education system is occurring amidst risks of the closure and disruption of vocational education institutions and technical vocational education institutions, mass layoffs of their personnel, and resistance to the adoption of digital human resource management tools in the analysed sector. Further transformational processes are feasible due to existing opportunities, including the reform of vocational education under the strategy of the Ministry of Education and Science of Ukraine, international cooperation supporting transformative processes, and the emergence of new digital human resource management tools. The survey results indicated that most respondents understand the necessity of and support transformative processes in human resource management within the vocational education system. It was determined that the material and technical base of their institutions is outdated, and administrative support is insufficient to implement modern digital tools. A disparity exists between the stated readiness for transformational processes and their actual implementation. Recommendations were proposed to address this gap, including improving technological infrastructure, fostering international cooperation in the digitalisation of education and human resource management, training and retraining stakeholders for the effective and ethical use of innovative digital technologies, and selecting digital tools aligned with the institution's strategic goals

■ **Keywords:** technological infrastructure; labour market; competitiveness; sustainable development; innovative digital technologies

Suggested Citation:

Zlenko, A., Kotsur, D., & Zlenko, Ya. (2024). Digital transformation in human resource management within the vocational education system. *Professional Education: Methodology, Theory and Technologies*, 10(2), 90-102. doi: 10.69587/pemtt/2.2024.90.



■ Introduction

The Ukrainian system of vocational education and technical and vocational education and training (TVET) is undergoing a reform process, the key objective of which is its modernisation, including through the use of digital tools. Effective management of well-trained and highly motivated personnel is a prerequisite for implementing transformative processes in vocational education. Given the relatively short period of reform implementation, there is a lack of information about the use of digital tools in human resource management in the country's vocational education system and TVET system, which justifies the relevance of the proposed article.

As of 2024, there has been an outflow of specialists from the vocational education system and TVET system in several regions, which has also reduced the motivation of applicants to enter specialised institutions (Baranovskyi, 2024). The need for fundamental reforms is driven by the understanding of the importance of vocational education for the recovery, development, and sustainable growth of the state. The reform of Ukrainian vocational education and TVET commenced in 2020 with the approval of the Resolution of the Collegium of the Ministry of Education and Science of Ukraine No. 12/2-3 (2020), which envisioned the establishment of an effective management and financing system, the improvement of the quality and content of vocational education, the development of public-private partnerships, and the popularisation of the field. Popularisation of vocational education and working professions (n.d.) explained the necessity of the reform using statistics, according to which vocational education and TVET are less popular than higher education. Approximately 2/3 of graduates choose to study at higher education institutions, and 1/3 of graduates under the age of 35 are unemployed. Attracting school graduates to vocational education institutions and TVET education institutions is impossible without creating a sufficient material and technical base, aligning the content and methods of teaching with the requirements of employers, and involving qualified specialists in cooperation. According to I. Shevchuk & A. Shevchuk (2022), attracting specialists is an extremely challenging task in conditions of reduced funding, forced unpaid leave, lack of career opportunities, etc.

Some of the aforementioned problems can be addressed through digital transformation in human resource management within the vocational education system and TVET system. Y. Sotnikova *et al.* (2021) emphasised in their research that the shift from analogue to digital information coding generates changes not only of a technological nature but also of a socio-cultural one. The use of digital technologies makes the process of acquiring knowledge and skills not only more efficient and comfortable but also highlights several economic and socio-cultural problems, including social inequality in access to innovation. Existing problems

necessitate further study of the specifics of introducing digital technologies into the educational process.

The advantages, disadvantages, and features of implementing digital technologies in human resource management have been reflected in academic research, in particular, by S. Rudakova *et al.* (2020). Having analysed the features of implementing digital technologies in human resource management, the researchers emphasised the importance of deep transformational processes, including changes in the mindset of company managers and employees. Such changes include a shift towards teamwork with the aim of identifying the prospects of digital technologies and proposing strategies for the successful implementation of existing opportunities.

H. Chaplaev *et al.* (2023) analysed the prospects of using artificial intelligence, thus highlighting the main aspects of implementing technologies in the human resource management process. According to experts, these aspects include access to and proficiency in digital technologies in human resource management, as well as the readiness of responsible individuals to use these technologies. Readiness to use such technologies serves as an effective corporate tool that can be used to analyse large amounts of data, study trends, and timely identify and resolve specific problems in human resource management.

A similar opinion was found in the article of K. Matkivska & O. Zachko (2024), who studied the prospects of using digital technologies in human resource management in various sectors of the economy. According to the scientists, the most promising areas are the use of digital technologies for employee training and development, effective communication, and objective assessment of the performance of individual employees and groups of employees. The features of using digital technologies to assess employee performance were also studied by N. Escriba-Carda *et al.* (2024), whose theoretical model emphasises the potential of digital technologies in implementing a more flexible approach to employee evaluation. The use of digital technologies provides a more comprehensive assessment and helps develop an individual professional trajectory for each employee. According to A. Stef & E.L. Crisan (2024), the capabilities of digital technologies in human resource management increase employee motivation and their willingness to engage in long-term cooperation with the company. A similar opinion was proposed in the article by J.L. Nikolic (2023), who investigated the features of using digital technologies in human resource management in Serbian companies. The author emphasised the effectiveness of digital technologies in creating a flexible professional environment, which has become especially valuable for 21st century employees. N.T.T. Thuy (2023) emphasised that employees' perception of digital technologies in professional practice directly depends on the attitude of those responsible

for human resource management towards these technologies. Experts agreed that the introduction of digital technologies increases the effectiveness of human resource management.

It should be noted that the cited sources do not provide an understanding of the specifics of using digital technologies in human resource management in the vocational education system. The analysed studies do not contain enough factual information regarding the implementation of digital technologies in the context of the reform of vocational education and TVET in Ukraine. The study aimed to analyse the use of digital technologies for human resource management in the context of the reform of national vocational education.

Materials and Methods

As the primary materials for the study, the following were selected: Popularisation of vocational education and working professions (n.d.); Vocational education in the conditions of sustainable development of society (n.d.); Resolution of the Collegium of the Ministry of Education and Science of Ukraine No. 12/2-3 (2020); Resolution of the Collegium of the Ministry of Education and Science of Ukraine No. 9/3-3 (2021); methodological recommendations for developing a concept for the implementation of a competency-based approach to learning in a vocational (technical and vocational) education institution (Shyian, 2022); Vocational education in the conditions of sustainable development of society (n.d.) and analytical materials of the Ministry of Education and Science of Ukraine (2023). As auxiliary materials, studies on the state of development of vocational education and TVET conducted since 2020 were selected. These materials included articles by Ye. Hovorov & O. Shulha (2023) and T.S. Machacha (2024). The selected materials were analysed to contextualise the state of development of vocational education in Ukraine, starting from 2021.

One of the key methods of research was a SWOT analysis, aimed at identifying and examining the internal and external factors influencing the development of vocational education and the implementation of digi-

tal technologies in human resource management. This method was also used to assess the risks and prospects of implementing digital human resource management in the Ukrainian system of vocational education and TVET. The study also applied a cost-benefit analysis method to evaluate the use of digital technologies in human resource management.

A sample of 100 respondents was analysed, who, as of 2024, had or have experience working in vocational education institutions and TVET education institutions. The sample included employees of the Berdiansk Mechanical Engineering College, the Zaporizhia National University (ZNU) Hydropower College, the Melitopol College Tavria State Agrotechnological University (TSAU), and the Vocational College of Business and Food Technologies of ZNU. All participants in the online survey, conducted using Google Forms, were informed about the purpose and objectives of the study and provided voluntary consent to participate. Respondents were asked to assess the factors of digitalisation of management processes in the system of vocational education and TVET, providing answers to the following questions: "How would you rate your level of awareness of the reform of vocational education in Ukraine?", "Do you think the reform of vocational education in Ukraine is appropriate?", "What, in your opinion, is the level of readiness of the educational institution for the implementation of digital management technologies?", "What, in your opinion, is the impact of using digital technologies on the quality of performing professional duties?", and "What, in your opinion, is the level of support from the management of your educational institution for the digitalisation of professional activities?". Respondents' answers were assessed on a 10-point Likert scale, where 0 meant absolute disagreement with the statement, while 10 was used to denote absolute agreement. In addition to the mentioned methods, material for this study was collected through a survey of respondents in compliance with The Declaration of Helsinki (2013). The data obtained through the survey of respondents were analysed using the Harvard Model of Human Resource Management (Fig. 1).

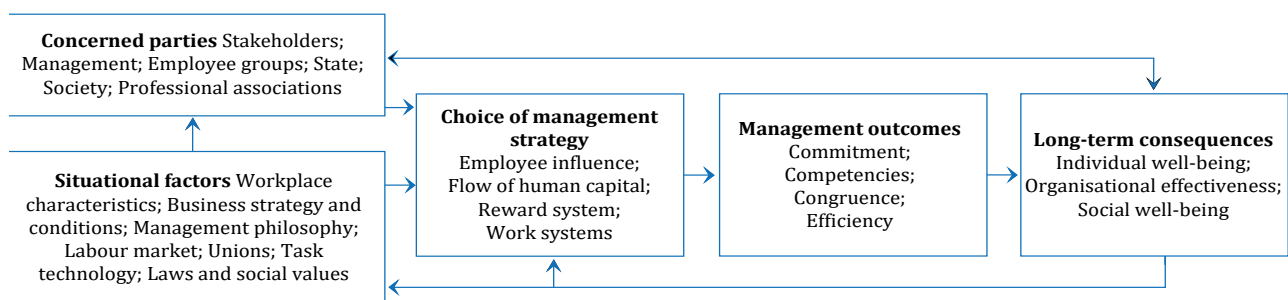


Figure 1. Harvard Model of Human Resource Management

Source: compiled by the authors of the study based on materials by G.E. Abalaka & Y.T. Agbaje (2023)

The chosen model assumes that the process of human resource management is based on an understanding of situational factors and the interests of concerned parties. The developed management programme incorporates key elements of personnel management policy, the outcomes of such policy, and its long-term consequences. Ideas derived from the analysis of survey results were used to create recommendations for improving the effectiveness of using digital tools for human resource management within the vocational education system and TVET system in Ukraine.

■ Results

Contextual analysis of human resource management in the vocational education system

According to the Popularisation of vocational education and working professions (n.d.) by the Ministry of Education and Science of Ukraine, as of 2021, there were 750 vocational education institutions in the country, with an enrolment of 239,900 students. The majority of students (164,200) entered vocational education

institutions after completing the ninth grade, thus confirming the view that graduates with a complete secondary education predominantly choose higher education institutions.

The cited report indicates that vocational education institutions and TVET education institutions are unevenly distributed across the country: the largest number of them is documented in Dnipro (58), Lviv (55), and Donetsk (43) regions. Some institutions, especially those located in combat zones or non-controlled territories, have been destroyed or evacuated, creating additional difficulties in recruiting applicants, retaining existing students, and ensuring a sufficient number of qualified staff. Implementing digital human resource management tools under such conditions becomes an extremely challenging task. A SWOT analysis helped to identify factors influencing the use of digital tools in human resource management within the Ukrainian vocational education system. The key factors obtained through this analysis are documented in Table 1.

Table 1. Factors influencing the use of digital tools in human resource management in the Ukrainian vocational education system

Strengths	Weaknesses
■ Proven effectiveness of digital tools for human resource management ■ Variety of digital human resource management tools ■ Willingness of employees to use digital tools	■ Outdated material and technical base ■ Lack of motivation to use digital tools
Opportunities	Threats
■ Vocational education reform under the Ministry of Education and Science of Ukraine strategy ■ International cooperation for vocational education reform ■ Emergence of new digital human resource management tools	■ Destruction and closure of vocational education institutions ■ Mass layoffs of personnel in vocational education institutions ■ Rejection of the implementation of digital human resource management tools in vocational education institutions

Source: compiled by the authors of the study based on materials by Ye. Hovorov & O. Shulha (2023), Ministry of Education and Science of Ukraine (2023), T.S. Machacha (2024)

The table showed that the strengths of using digital tools in human resource management include their diversity and the readiness of the vocational education system to use them. Digital tools that can be used in human resource management include internal social networks, which help to establish communication and interaction among team members. Such networks are also important for sharing knowledge, developing teamwork and camaraderie, and improving the psychological climate within the team. An example of such a digital tool is the Microsoft Teams digital platform, where employees can undergo training, exchange materials, and communicate to share knowledge and experience. Vocational education institutions and TVET education institutions also encourage their employees to use digital learning platforms such as Coursera, Moodle, and ATutor. The use of these and similar platforms is a tool for professional training and retraining of employees. In addition to the mentioned tools, human resource management in the vocational education system is carried out using payroll management platforms,

such as Sage or Meta4, and advanced electronic signature solutions.

The weaknesses in implementing digital human resource management include an outdated material and technical base, associated with a lack of ability or motivation to use certain tools. According to the decision of the Resolution of the Collegium of the Ministry of Education and Science of Ukraine No. 9/3-3 (2021), as of 2021, 60% of the material and technical base of vocational education institutions was outdated, which makes it impossible to use certain tools: FlipHTML5, Canva, Journo Portfolio and other tools for creating digital portfolios of employees' professional achievements. An outdated material and technical base are also one of the reasons for the dismissal of employees from vocational education institutions and TVET education institutions who could have become the driving force for the introduction of digital human resource management technologies.

According to the decision of the Resolution of the Collegium of the Ministry of Education and Science of

Ukraine No. 12/2-3 (2020), the main opportunity for more active use of digital tools in human resource management in vocational education institutions is the reform of the sector, approved by the Collegium of the Ministry of Education and Science of Ukraine in 2020. Based on the Resolution of the Collegium of the Ministry of Education and Science of Ukraine No. 9/3-3 (2021), the transformation of the sector is aimed at building an effective education and financing system, improving the content and quality of vocational education, developing public-private partnerships, and popularising the field. The implementation of transformational processes is also facilitated by participation in international initiatives, such as the EU program "EU4Skills: Better Skills for Modern Ukraine", the aim of which, according to O. Shyian (2022), is to align the content of vocational training with the requirements of the labour market. One of the threats to the use of digital technologies in vocational education is the ongoing armed aggression and the associated destruction and uncertainty. The Ministry of

Education and Science of Ukraine (2023) noted that the challenges of wartime had a smaller impact on the sustainable development of vocational education than expected. As of 2023, 93% of vocational education institutions and TVET education institutions were operating in Ukraine, 31% of which worked in a mixed format. A significant threat, however, is that most vocational education institutions in the country were transferred to a mixed (49%) or distance (20%) format. This shift to these learning formats has led to mass layoffs and a high likelihood of a staffing crisis once martial law is lifted.

Understanding the likelihood of such a crisis, a cost-benefit analysis was conducted to determine whether it is advisable to develop digital approaches to human resource management in conditions of uncertainty. To conduct the analysis, the further development of digital human resource management technologies in the vocational education system was compared with the rejection of such development. The results of the comparison are presented in Table 2.

Table 2. Advantages and disadvantages of using digital technologies for human resource management in the vocational education system, compared opting against their use

Analysis aspects	Use of digital tools	Abandonment of digital tools
Costs	Search for and implementation of appropriate digital tools, constant updating of digital technologies, preparation and motivation of staff to use the tools	This option incurs no costs as it does not involve any transformations
Short-term prospects	Searching for tools, costs for tools and staff training, errors in using the tools, abandonment of certain tools	No errors or costs due to the rejection of implementing digital tools in human resource management
Long-term prospects	Effective human resource management, increased productivity, reduced turnover, sustainable development	Stagnation of the system, systemic errors, low effectiveness in competitiveness

Source: compiled by the authors of the study

The analysis conducted indicates that although the use of digital tools requires certain financial, material, and other costs in the short term, it is nonetheless capable of generating long-term benefits such as reducing the number of errors through automation of certain processes, increasing the quality of work, and increasing the prestige of vocational education. In terms of cost-benefit analysis, the implementation of digital human resource management tools corresponds to the key objectives of the vocational education reform, including ensuring its sustainable development. That is, the implementation of digital human resource management tools is a recommended strategy, despite its certain short-term drawbacks.

Implementation of digital tools in vocational education

At the beginning of the survey, respondents were asked to assess their level of awareness of the main provisions of the vocational education reform using a Likert scale. According to the obtained data, 48% of respondents rated their level of awareness as high (7-10 points

on the proposed scale), 36% of respondents considered their level of awareness to be average (5-6 points on the used scale), and another 16% of respondents assessed their level of awareness of the main provisions of the reform as low, assigning it from 1 to 4 points. Based on the results obtained, it can be argued that most respondents understand the transformation processes taking place in the system of vocational education and TVET in Ukraine.

Survey participants were asked to assess their attitude towards the reform by subjectively evaluating its necessity on a 10-point scale, where 1 meant no such necessity, and 10 – absolute necessity. The vast majority (63%) of respondents rated the necessity of the reform, including the use of digital resources, as high (7-10 points). For 21% of respondents, such a need was average (5-6 points), and 16% of survey participants considered such a need low. The vast majority of respondents understood and supported the transformation processes in vocational education, including the use of digital management tools. Respondents were also asked to assess the level of readiness of their

educational institution to implement digital tools in key management processes. The analysis of the received answers is presented in the Figure 2.

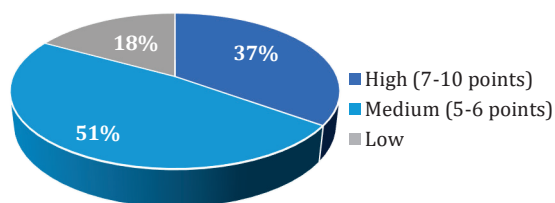


Figure 2. Level of readiness of the educational institution

for implementing digital management technologies

Source: compiled by the authors

The presented diagram illustrated the discrepancy between the understanding of the need for vocational education reform and the readiness for this reform. Based on the above-mentioned responses, the majority of respondents understand and support the transformation processes, including the active implementation of digital technologies. The implementation of such technologies is hindered by the unpreparedness of vocational education institutions, including due to an outdated material and technical base. Respondents were also asked to assess the impact of using digital technologies on the quality of performing professional duties. More than half (53%) of respondents rated this impact as high (7-10 points). For 34% of respondents, this impact was average (5-6 points), and for another 13% – low. The obtained data correlates with the respondents' assessment of the need for transformation processes and their readiness to support these processes. In addition to the mentioned questions, respondents were asked to assess the support they receive from the management of the vocational education institution in the process of using digital technologies. Only 32% of respondents considered the level of such support to be high (7-10 points), while 49% of respondents characterised this level as average (5-6 points), and 19% – as low (1-4 points).

Based on the responses received, it can be concluded that there are certain barriers to the implementation of digital human resource management tools in the vocational education system. These obstacles include the mismatch between the institution's material and technical base and the technical requirements for the implementation of digital tools, as well as a low level of support for this process. Overcoming these obstacles could be an important step towards reforming vocational education and TVET through the introduction of digital human resource management tools.

The survey results were analysed through the prism of the Harvard Model of Human Resource Management. The proposed model consists of five elements, presented in the figure below. Based on the Harvard Model of Human Resource Management, it can be assumed

that the use of digital tools is expedient, as it meets the needs not only of management but also of employees and employee groups. Supporting the reform in the vocational education system, the latter would like their professional activities to be more technologically advanced and their professional development to be more individualised and systematic. Achieving this goal involves the use of digital technologies that help avoid errors inherent in traditional human resource management, such as subjective assessment or the inability to predict and prevent certain risks. The use of digital technologies in human resource management is a key interest of broader groups of people – society and the state, which require effective vocational education that provides graduates with relevant knowledge and skills. V. Lutsai (2022) emphasised that as of 2022, the unemployment rate in Ukraine was 9.9% of the working-age population, and the highest rate of 19.1% was recorded among people under the age of 25. Given these statistics, it can be assumed that the state and society are interested in ensuring that graduates of vocational and professional institutions are competitive in the labour market.

From the presented model, it is clear that the needs of stakeholders and individual elements of the transformation processes are determined by an understanding of situational factors. Based on the data from the survey conducted, the implementation of digital management tools is conditioned by an understanding of the need for transformation processes and readiness for them. The understanding of the need for reform is demonstrated in the decision of the Resolution of the Collegium of the Ministry of Education and Science of Ukraine No. 9/3-3 (2021), according to which the quality of vocational education and TVET does not fully meet the needs of the labour market for qualified personnel. Eliminating the mismatch is possible by updating the teaching staff, and adding specialists who are able to implement modern practices of training and preparing qualified workers. Cooperation with specialists of this level is impossible without the use of digital technologies at various stages: recruitment, training and retraining, certification, and material incentives.

Understanding the needs of stakeholders and situational factors determines the choice of approaches for implementing digital human resource management technologies. Based on the survey results, it can be concluded that these approaches include updating the institution's material and technical base to bring it into compliance with the requirements for using specific digital tools. Effective approaches also include informing responsible persons about the prospects of using specific digital tools and implementing a training and retraining system aimed at the effective use of certain digital human resource management tools.

The importance of choosing the right program is determined by the awareness of the long-term results of its implementation, including employee commitment,

competencies, congruence, and cost-effectiveness. An example is providing access to free digital resources to support the professional training and retraining of employees of vocational education institutions and TVET education institutions: Mozabook, CartoDB, Mindomo, and others. Even during the pandemic, educational institution employees received free access to high-quality international platforms such as Coursera, where they could deepen their professional knowledge and improve “soft” skills such as communication, conflict resolution, and others. These and other digital resources used in human resource management can significantly increase the motivation and commitment of employees of vocational education institutions. The link between the use of digital tools and employee commitment has been confirmed in previously conducted studies, including B. Ly (2022) and M. Nazim *et al.* (2024), who argued that the implementation of such tools demonstrates to employees the company’s interest in their professional growth and success. In addition to managerial results, long-term consequences were taken into account, including individual and social well-being and organisational effectiveness. The reform of the modern vocational education system is due to its low efficiency, as noted by Yu. Balaniuk *et al.* (2022), according to which, of the 300 professions for which training is provided in vocational education institutions and TVET education institutions, only 100 are in demand on the labour market. From the point of view of social well-being, such a situation is unacceptable, as training in unneeded specialties not only wastes time and resources but also increases the level of unemployment in the country and exacerbates the associated problems.

No less important is the implementation of digital technologies to increase organisational efficiency. One example is the use of digital tools and platforms to search for candidates for open vacancies. Digital tools can also be used to assess the quality of a candidate’s professional training. Based on the data obtained from the survey participants, an example is the Melitopol College TSATU, where an internal platform was developed to assess the professional achievements and skills of candidates before signing a cooperation agreement. Such an approach helps to reduce the risk of errors and choose a motivated candidate who is focused on long-term cooperation with a vocational education institution or TVET education institution. Despite the significant advantages of this approach, it should be noted that cases of using platforms and other digital tools when selecting employees of vocational education institutions and TVET education institutions are rare.

Strategies for implementing digital transformation in human resource management in the vocational education system

Based on the SWOT analysis, it can be argued that while the use of digital human resource management tools

has many advantages, it also involves overcoming numerous challenges and risks. Based on this observation, digital transformation in education is a multi-component process that requires careful planning. To support this idea, one can refer to the case of Berdiansk Mechanical Engineering College, where the implementation of digital technologies was accompanied by staff training both internally and with the involvement of specialists from other institutions. The effectiveness of the implementation of digital tools was subsequently evaluated through an online survey, the results of which can be found on the college’s website.

Based on the case study, it can be concluded that a priority task for the first stage of implementing digital management tools is the development of a powerful technological infrastructure, including high-speed internet, modern equipment, and reliable software solutions capable of supporting both educational and administrative functions. Based on the survey data, an example of the effective implementation of the first stage is the Vocational College of Business and Food Technologies of ZNU, where a network was created to support the institution’s work in a mixed format, i.e., offline and online. The mixed format opens up new opportunities for cooperation, knowledge sharing, and experience exchange at the regional, national, and international levels. An example of the exchange of professional experience was the international conference “Modern Prospects for the Development of Accounting, Finance, Economics, Management, Law and Engineering” held on 5-6 December 2024, at the college (Modern prospects..., 2024). The conference was made possible thanks to the use of fibre-optic technologies and alternative power sources, which allow the use of digital technologies and tools even during power outages. An important factor is also the presence of a stable internet signal, with a minimum connection speed of 3-6 Mbps. Creating or updating the infrastructure following minimum technological requirements is the way to effectively use digital management tools in the vocational education sector and TVET sector.

Overcoming obstacles in creating a technological infrastructure in vocational education is possible through international cooperation. Based on the information obtained from the survey participants, an example is the cooperation of ZNU Hydropower College with the regional representative of Microsoft, as a result of which the institution’s employees have access to the Microsoft Azure cloud environment for creating, deploying, and managing applications and services through Microsoft’s global network of data centres. The cost of using the environment depends on the type of service used (for example, Azure Virtual Machines for instant access to Microsoft Windows or Linux VMs; Azure SQL Database for creating applications that scale using a managed intelligent SQL database in the cloud;

or Azure Functions for executing managed event-driven serverless code functions with end-to-end development experience), and is partially or fully covered by grants received. For college students, access to key Microsoft Azure products is free thanks to the international program supporting digital initiatives in education. International support is key to creating infrastructure and effectively implementing digital tools in human resource management in the country's vocational education institutions and TVET education institutions.

At the second stage of the transformation process, it is important to involve stakeholders: heads of educational institutions, employees, representatives of state and non-governmental institutions, etc. Analysing the data from the survey participants, it can be argued that an illustration of this statement is the interaction of Ukrainian vocational education institutions and TVET education institutions with the British Council, for example, within the framework of the "SWITLO" program (Skills and well-being..., n.d.). The purpose of the cooperation is to assess the current level of professional competence of employees in the vocational and professional education sector and to plan its continuous improvement. The project is designed, among other things, for employees of the vocational education sector and TVET sector whose level of English is sufficient to take the course. This and most other British Council initiatives are free for Ukrainian education sector employees, which increases their involvement in the transformation processes. Despite existing differences, the main goal of all the mentioned initiatives is to create a professional network based on which digital transformations in the sector would take place.

When digitalising human resource management in the vocational education sector and TVET sector, it is also recommended to consider the ethical aspects of the transformation process, including integrity and confidentiality. From an ethical standpoint, it is important to use digital technologies purposefully for objective evaluation and to ensure equal opportunities for all employees in the vocational education sector and TVET sector. Work in this direction involves raising awareness among sector employees about the ethical dilemmas associated with digital transformation and possible approaches to resolving them. To address these dilemmas, vocational education institutions and TVET education institutions may be recommended to cooperate with international partners and participate in educational initiatives, such as EdCamp-in-a-box and Be Internet Awesome (Empowering kids..., n.d.). Based on the research materials, a successful case is the participation of employees of the Melitopol College TSATU in the proposed initiatives, who have acquired skills in the ethical use of digital technologies in their professional activities. These initiatives also contribute to reducing the digital divide that exists between certain categories of employees in the sector, such as those working in

large cities and small towns, or representatives of the younger and older generations of educators.

Beyond the identified stages, digital transformation involves selecting appropriate tools and technologies to achieve strategic goals. Given the variety of digital tools, it can be concluded that the choice largely depends on the specific strategic task of a vocational education institution and TVET education institution. Creating a unified network for sharing data about sector employees, monitoring the quality of their work, etc., is possible through the use of a cloud environment. Employee recruitment within the framework of workforce planning can be facilitated using social networks such as LinkedIn, Twitter, or Facebook. Planning an individual professional track is possible using learning tools such as Padlet, Hopln, Trello, Basecamp, and others. Supporting teamwork within an educational institution or sector is possible through the use of collaboration platforms, including Microsoft Teams, Flux, My-Forms, and others. It is also recommended to pay attention to Ukrainian tools, such as "Salary and Human Resource Management" – a multifunctional program designed for automatic calculation of salaries and implementation of the company's human resources policies (BAS salary..., n.d.) – which are effective for implementing the company's human resources policies and automating various company services.

Digital transformation is one aspect of the reform of the vocational education sector and TVET sector, aimed at aligning the educational process with the demands of the labour market. The data obtained indicate that sector employees are informed about the prospects of digital transformation and demonstrate a high level of support for the process. The material and technical base of some educational institutions is not ready for the large-scale implementation of digital technologies, which significantly slows down the transformation process. Considering the existing obstacles, strategies for the digitalisation of human resource management in vocational education institutions and TVET education institutions have been proposed. The proposed strategies include creating a powerful technological infrastructure; involving stakeholders, including through international cooperation; training sector employees in the effective and ethical use of existing digital tools; and selecting technologies according to the sector's strategic goals.

■ Discussion

Based on the analysis conducted, it can be concluded that the results of the presented study correspond to the conclusions drawn in previously conducted research. B. Ly (2022) confirmed the importance of digitalising human resource management to increase the competitiveness of an individual enterprise or sector. In this study, the scientist relied on data obtained from 250 employees from various sectors of the economy, which made it possible to trace the link between the use

of digital tools, employee motivation, and enterprise efficiency. Similar conclusions were drawn by H. Xinyue & S. Marcelo (2024), whose quantitative and qualitative analysis confirmed that by using technological changes, an enterprise can optimise processes, promote innovation, and create a dynamic environment. Such an environment, according to O.O. Emmanuel (2021), is one of the key factors of high employee motivation and loyalty. The cited studies prove the importance of the digitalisation of management as a factor of success in various segments of the economy. A correspondence can be observed between the previously presented studies and the results of the conducted survey, according to which respondents recognise the need for digitalisation and support the relevant strategies, despite the uncertainty caused by the state of martial law.

Based on previous research, it can be stated that digital transformations are just as important for the education sector as they are for other segments of the economy. Confirmation of this idea was found in the study of D. Mdhloose & G. Mlambo (2023), according to whom the use of digital technologies improves the quality of the learning process by enhancing interaction between its participants. S. Timotheou *et al.* (2022) argued that digitalisation creates a special educational space characterised by greater flexibility, promotes an individualised approach to learning, and helps to bridge the gap between theory and practice. The importance of digital transformations in education was also emphasised by O. Karabin *et al.* (2024), who argued that there is a direct link between the use of various digital tools and academic results. Previously conducted research has confirmed the idea presented in this research about the need for digital transformations in the education sector.

The conducted research differs from previous studies as its focus is not on recipients of vocational education and TVET, but on those who provide such educational services. Based on the survey conducted, it can be stated that employees in the vocational education sector and TVET sector are ready to implement digital technologies and can be a driving force for transformational processes. As of 2024, the experience of employees in the vocational education sector and TVET sector regarding the implementation of digital management tools is insufficiently studied. Isolated articles, including V. Kallunki *et al.* (2023), indicated that the use of digital tools has some advantages for sector employees, which are manifested at the practical, administrative, and individual levels. Education sector employees are trying to integrate digital technologies to improve their professional results and the sustainable development of the sector. Although the cited study is relevant, it should be noted that it was conducted in Finland, whose socio-economic and cultural aspects of the education system may differ from Ukrainian realities. It is also important that the study by V. Kallunki *et al.* (2023) was not focused directly on the vocational education system

and TVET system, which is a priority of this research. It can be argued that the presented study contributes to the discourse on digital transformation processes in the vocational education system and TVET system.

Implementing transformation processes requires understanding and overcoming challenges from individual employees and groups of employees in the sector, as well as from the administration of vocational education institutions and TVET education institutions and society as a whole. Several studies have been devoted to studying the barriers to digitalising human resource management, including S. Akter *et al.* (2023). According to the researchers, one of the difficulties lies in aligning the transformation with the needs of the workforce. The conclusion presented by S. Akter *et al.* (2023) is consistent with the results of the survey, according to which some employees of vocational education institutions and TVET education institutions do not have sufficient resources and support to implement digital tools in their professional practice.

The study of barriers to the digital transformation of management processes was also the subject of the article of T. Gkrimpizi *et al.* (2023), in which six main types of difficulties were presented. According to the researchers, the introduction of digital human resource management is hindered by the following groups of factors: environmental, strategic, organisational, technological, people-related, and cultural. The impact of some of these groups of factors was also studied in the presented study. Environmental factors manifest themselves through the conditions in which the Ukrainian system of vocational education and TVET develops. The pandemic and related restrictions, and subsequently the full-scale invasion, confirmed the resilience of the system but also revealed the need to modernise the digital infrastructure, as well as to train and retrain experts in digital human resource management.

The value of the previously conducted research for this research lies not only in the analysis of barriers to digitalisation but also in the proposal of strategies to overcome them. Some of the strategies proposed in previous studies can be implemented in the realities of the reform of vocational education and TVET in Ukraine. M. Dabic *et al.* (2023) suggested overcoming resistance to digitalisation at the individual and sector levels through a comparative analysis of the advantages and disadvantages of using digital tools in human resource management. According to the researchers, the advantages of using digital tools are more significant and can produce a more long-lasting effect compared to rejecting digitalisation. The advantages that M. Dabic *et al.* (2023) suggested paying attention to included various opportunities for skilled workers, improved working conditions, increased profits, and greater flexibility, manifested in the ability to work in comfortable conditions.

Similar recommendations were presented in the article of M. Rokhadi *et al.* (2023), who conducted a

comparative analysis of a scenario involving digital transformation processes and a scenario of rejecting such processes. According to the scientists, the fact that the implementation of digital management tools involves solving certain problems and ethical dilemmas does not diminish the value of these tools, which is realised through the emergence of new opportunities for professional development, increased efficiency and productivity, and the emergence of innovative industry solutions. The approach to digitalising human resource management proposed by M. Rokhadi *et al.* (2023) is relevant to the Ukrainian system of vocational education and TVET, which is in the extremely difficult conditions of martial law, when refusing any changes may seem like the most rational solution. The research of M. Dabic *et al.* (2023), M. Rokhadi *et al.* (2023), and other experts indicate that the short-term benefits associated with rejecting digitalisation do not compensate for the long-term losses caused by such a strategy. This conclusion is consistent with the results of the analysis of the advantages and disadvantages proposed in this study.

There is a correspondence between the conclusions of this study and the results of previous research. The results obtained can be scaled up to a large group of employees of vocational education institutions and TVET education institutions, whose work quality depends on digital transformation processes in the sector. The understanding of transformation processes by employees and their readiness for them is an important prerequisite for the large-scale application of digital human resource management tools in the selected sector.

■ Conclusions

The national system of vocational education and TVET is undergoing reform, the main objective of which is to adapt to the demands of the labour market. Achieving this goal involves the digital transformation of the sector through the use of innovative human resource management tools. A survey of employees of vocational education institutions and TVET education institutions and a study of the experience of four educational institutions included in the sample showed that representatives of the sector understand the need for and support transformation processes. A mismatch was observed between the declared readiness for reform and the outdated material and technical base and limited administrative support, which hinders its implementation. The inability to update the base is largely due to the challenges of wartime, such as insufficient funding

and a lack of basis for long-term planning. Based on the analysis of benefits and costs, continuing the transformation processes in the vocational education sector and TVET sector is a viable solution, as the short-term benefits of abandoning the reform cannot compensate for the long-term losses caused by this decision. In order to achieve the highest possible result with minimal risks, it is recommended to plan digital transformation processes taking into account existing opportunities and threats. The results of the SWOT analysis indicate that the main opportunities lie in aligning the functioning of the vocational education system and TVET system with the demands of the modern labour market. Threats include the inability of the education system to function effectively and implement innovative management tools due to the challenges of war and the associated economic and personnel difficulties. Achieving a balance between opportunities and risks is possible through the implementation of strategies for implementing digital human resource management tools in the vocational education sector and TVET sector. The paper considered various strategies, including creating a branched technological infrastructure for the implementation of various digital management technologies, international cooperation to create strategies for digital human resource management, motivating the ethical use of existing digital tools, and selecting digital tools according to the strategic goals of the institution. It is also effective to constantly evaluate the process of implementing digital tools in human resource management to identify potential difficulties and obstacles, as well as to plan strategies to overcome them. To increase the validity of future research, it is recommended to use the interview method and case studies to gain a deeper understanding of the factors influencing the digital transformation of human resource management in vocational education institutions and TVET education institutions and to effectively respond to these factors. A comparative analysis of the digital transformation of human resource management in Ukrainian vocational education institutions and TVET education institutions with processes in other European countries and the world is also recommended.

■ Acknowledgements

None.

■ Conflict of Interest

None.

■ References

- [1] Abalaka, G.E., & Agbaje, Y.T. (2023). Strategic human resource management (SHRM) concepts and models for virtual organization management: A literature review. *Texila International Journal of Management*, 9(2), article number 004. [doi: 10.21522/TIJMG.2015.09.02.Art004](https://doi.org/10.21522/TIJMG.2015.09.02.Art004).
- [2] Akter, S., Biswas, K., Vrontis, D., Cooper, S.C.L., & Tarba, S.Y. (2023). Mastering digital transformation in workforce management. *Production Planning & Control*, 35(13), 1525-1532. [doi: 10.1080/09537287.2023.2270465](https://doi.org/10.1080/09537287.2023.2270465).

- [3] Balaniuk, Yu., Fediuk, V., Koval, O., & Kolesnikova, H. (2022). *Round table "The functioning of vocational (technical and vocational) education"*. Retrieved from <https://nqa.gov.ua/news/kruglij-stil-funkcionuvanna-profesijnoi-profesijno-tehnicnoi-osviti-v-umovah-voennogo-stanu/>.
- [4] Baranovskyi, M. (2024). *Comprehensive analysis of the vocational education system in Zaporizhzhia Region and its compliance with the needs of the regional labour market*. Kyiv: United Nations in Ukraine.
- [5] BAS salary and human resources (HR). (n.d.). Retrieved from <https://www.softcom.ua/ua/bas/programs/bas-zarplata-ta-upravlinnya-personalom/>.
- [6] Chaplaev, H., Mazhiev, K., & Idigova, L. (2023). Use of digital technologies in human resource management. *SHS Web of Conferences*, 164, article number 00027. doi: 10.1051/shsconf/202316400027.
- [7] Dabic, M., Maley, J.F., Svarc, J., & Pocek, J. (2023). Future of digital work: Challenges for sustainable human resources management. *Journal of Innovation & Knowledge*, 8(2), article number 100353. doi: 10.1016/j.jik.2023.100353.
- [8] Emmanuel, O.O. (2021). The dynamics of work environment and its impact on organizational objectives. *Annals of Human Resource Management Research Journal*, 1(2), 145-158. doi: 10.35912/ahrmr.v1i2.826.
- [9] Empowering kids to be safe, confident explorers of the online world. (n.d.). Retrieved from <https://beinternetawesome.withgoogle.com/en-us>.
- [10] Escriba-Carda, N., Redondo-Cano, A., & Escriba-Moreno, M.A. (2024). Firms' digital transformation and e-human resource management. A qualitative approach. *Tec Empresarial*, 18(3), 103-128. doi: 10.18845/te.v18i3.7289.
- [11] Gkrimpizi, T., Peristeras, V., & Magnisalis, I. (2023). Classification of barriers to digital transformation in higher education institutions: Systematic literature review. *Education Sciences*, 13(7), article number 746. doi: 10.3390/educsci13070746.
- [12] Hovorov, Ye., & Shulha, O. (2023). Analysing the state of vocational education in the current context. *Bulletin of the T.H. Shevchenko National University "Chernihiv Colehium"*, 180(24), 3-9. doi: 10.58407/visnik.232401.
- [13] Kallunki, V., Katajavuori, N., Kinnunen, P., Anttila, H., Tuononen, T., Haarala-Muhonen, A., Pyorala, E., & Myyry, L. (2023). Comparison of voluntary and forced digital leaps in higher education – teachers' experiences of the added value of using digital tools in teaching and learning. *Education and Information Technologies*, 28, 10005-10030. doi: 10.1007/s10639-022-11559-7.
- [14] Karabin, O., Bielova, V., Hladun, T., Makarenko, L., & Bozhkov, A. (2024). The role of digital technologies in increasing the students' involvement in the educational process. *WSEAS Transactions on Information Science and Applications*, 21, 77-89. doi: 10.37394/23209.2024.21.8.
- [15] Lutsai, V. (2022). The problem of youth unemployment in Ukraine. *Analytical and Comparative Jurisprudence*, 5, 182-186. doi: 10.24144/2788-6018.2022.05.33.
- [16] Ly, B. (2022). Transforming commitment into performance: A study of digital transformation in the Cambodian public sector amidst a pandemic. *Cogent Business and Management*, 11(1). doi: 10.1080/23311975.2024.2333609.
- [17] Machacha, T.S. (2024). *Conditions for the effective implementation of the content of the technological educational field of basic secondary education in the educational process of the new Ukrainian school*. In *Actual problems of technological and vocational education: Collection of materials of the II all-Ukrainian scientific and practical internet conference* (pp. 135-138). Kremenets: VC KOGPI named after Taras Shevchenko.
- [18] Matkivska, K., & Zachko, O. (2024). Models of digitalization of HR management systems in security-oriented organizations. *Innovative Technologies and Scientific Solutions for Industries*, 1(27), 204-214. doi: 10.30837/ITSSI.2024.27.204.
- [19] Mdhlalose, D., & Mlambo, G. (2023). An overview of the effects of technology on education: Teaching and learning. *Education & Learning in Developing Nations (ELDN)*, 1(2), 83-88. doi: 10.26480/eldn.02.2023.83.88.
- [20] Ministry of Education and Science of Ukraine. (2023). *Education under martial law: Challenges, development, and post-war prospects*. Kyiv: Ministry of Education and Science of Ukraine.
- [21] Modern prospects for the development of accounting, finance, economics, management, law and engineering. (2024). Retrieved from <https://www.duet.edu.ua/en/press-center/news/2736>.
- [22] Nazim, M., Agung, A.A.G., Yudana, M., & Dantes, K.R. (2024). The effect of training on organizational commitment impacts primary school teacher performance in Central Lombok Regency. *International Journal of Religion*, 5(2), 145-156. doi: 10.61707/mbcxy947.
- [23] Nikolic, J.L. (2023). The impact of digital technologies on employee engagement: Case study of company "A" in Serbia. *The European Journal of Applied Economics*, 20(2), 29-40. doi: 10.5937/EJAE20-43248.
- [24] Popularisation of vocational education and working professions. (n.d.). Retrieved from <https://mon.gov.ua/osvita-2/profesiyno-tekhnichna-osvita/reforma-profesiynoi-osviti/populyarizatsiya-profesiynoi-osviti-i-robotnichikh-profesiy>.

- [25] Resolution of the Collegium of the Ministry of Education and Science of Ukraine No. 9/3-3 "On Methodological Recommendations for Optimising the Network of Vocational (Technical and Vocational) Education Institutions". (2021, September). Retrieved from <https://mon.gov.ua/static-objects/mon/sites/1/kolegiya-ministerstva/2021/11/02/Rish-9.3-3.vid.21.09.2021-Pro.Met.rekom.optym.zakl.profosv.pdf>.
- [26] Resolution of the Collegium of the Ministry of Education and Science of Ukraine No. 12/2-3 "On the Draft Strategy for the Development of Vocational (Technical and Vocational) Education for the Period until 2023". (2020, December). Retrieved from <https://mon.gov.ua/static-objects/mon/sites/1/kolegiya-ministerstva/2020/12/Proyekt%20Stratehiyi%20rozvytku%20proftekhsivity%20do%202023.pdf>.
- [27] Rokhadi, M., Sukistano, S., Hariyanti, H., & Mariyani, D. (2023). Management strategies to address human resources challenges in the information technology era. *Jurnal Minfo Polgan*, 12(2), 2082-2090. doi: 10.33395/jmp.v12i2.13152.
- [28] Rudakova, S., Danylevych, N., Shchetinina, L., & Kasianenko, Y. (2020). Digital HR – the future of human resources administration. *Business Inform*, 1, 265-270. doi: 10.32983/2222-4459-2020-1-265-270.
- [29] Shevchuk, I., & Shevchuk, A. (2022). Educational analytics through the prism of war: Challenges and opportunities for Ukrainian higher education. *Economy and Society*, 39. doi: 10.32782/2524-0072/2022-39-80.
- [30] Shyian, O. (2022). *Methodological recommendations for developing a concept for the implementation of a competency-based approach to learning in a vocational (technical and vocational) education institution*. Retrieved from <https://mon.gov.ua/static-objects/mon/sites/1/pto/2022/02/21/EU4Skills.metodychni.reccom.17.02.2022.pdf>.
- [31] Skills and well-being in teacher learning opportunities. (n.d.). Retrieved from <http://britishcouncil.org.ua/programmes/english/schools/switlo>.
- [32] Sotnikova, Y., Nazarova, G., Nazarov, N., & Bilokononko, H. (2021). Digital technologies in HR management. *Management Theories and Studies for Rural Business and Infrastructure Development*, 42(4), 527-535. doi: 10.15544/mts.2020.54.
- [33] Stef, A., & Crisan, E.L. (2024). Analysis of the impact of human resources employees' perceptions on the process of digital transformation. *IIMT Journal of Management*. doi: 10.1108/IIMTJM-02-2024-0023.
- [34] The Declaration of Helsinki. (2013). Retrieved from <https://www.wma.net/what-we-do/medical-ethics/declaration-of-helsinki/>.
- [35] Thuy, N.T.T. (2023). Digital technology readiness: The moderating role of employees' innovativeness in the technology acceptance model. In *Proceedings of the 11th international conference on emerging challenges: Smart business and digital economy 2023 (ICECH 2023)* (pp. 132-141). Dordrecht: Atlantis Press. doi: 10.2991/978-94-6463-348-1_13.
- [36] Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S.V., Gainnoutsou, N., Cachia, R., Mones, A.M., & Ioannou, A. (2022). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. *Education and Information Technologies*, 28, 6695-6726. doi: 10.1007/s10639-022-11431-8.
- [37] Vocational education in the conditions of sustainable development of society. (n.d.). Retrieved from <https://ivet.edu.ua/13029/profesiyna-osvitav-umovah-stalogo-rozvytku-suspilstva/>.
- [38] Xinyue, H., & Marcelo, J.S. (2024). The role of digital transformation in enhancing employee motivation and organizational efficiency: A study of enterprise management strategies. *International Journal of Science and Engineering Applications*, 13(10), 62-68. doi: 10.7753/IJSEA1310.1014.

Цифрова трансформація в управлінні персоналом у системі професійної освіти

Алла Зленко

Кандидат історичних наук, професор
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0002-5586-3984>

Дмитро Коцур

Кандидат фізико-математичних наук, доцент
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0003-0230-8095>

Яна Зленко

Викладач
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0009-0001-6052-7897>

■ **Анотація.** Метою даного дослідження було проаналізувати особливості цифрової трансформації в управлінні персоналом в системі професійної освіти України. Для досягнення цієї мети був використаний кількісний метод опитування та якісні методи аналізу вигід та витрат та SWOT-аналіз. Згідно результатів SWOT-аналізу, цифрова трансформація управління персоналом у системі професійної освіти відбувається на тлі ризиків руйнації та закриття закладів професійної та професійно-технічної освіти, масових звільнень персоналу цих закладів та відмови від впровадження цифрових інструментів управління персоналом у сегменті, що аналізувався. Подальші трансформаційні процеси можливі завдяки наявним перспективам, зокрема, реформі професійної освіти в рамках стратегії Міністерства освіти і науки України, міжнародному співробітництву на підтримку трансформаційних процесів та появі нових цифрових інструментів управління персоналом. Результати проведеного опитування показали, що більшість респондентів розуміють необхідність та підтримують трансформаційні процеси в управлінні персоналом у системі професійної освіти. Визначено, що матеріально-технічна база їхніх закладів є застарілою, а підтримка адміністрації недостатньо сильною для впровадження новітніх цифрових інструментів. Існує невідповідність між декларацією щодо готовності до трансформаційних процесів та їх фактичною реалізацією. Були запропоновані рекомендації на подолання цієї невідповідності: покращення технологічної інфраструктури, міжнародне співробітництво в галузі цифровізації освіти та управління персоналом, підготовка та перепідготовка зацікавлених осіб до ефективного та етичного використання інноваційних цифрових технологій та підбір цифрових інструментів згідно із стратегічними цілями закладу

■ **Ключові слова:** технологічна інфраструктура; ринок праці; конкурентоспроможність; сталий розвиток; інноваційні цифрові технології