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## Role of social communications in the development of interpersonal skills of future counselling psychologists

Olena Dudar\*

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■ **Abstract.** The purpose of this study was to ascertain how social interaction contributes to the development of key communication skills in psychology students and to identify effective educational methods that help this process. The research methodology employed a systematic approach, allowing for an in-depth exploration of how social communications contribute to the development of interpersonal skills in future counselling psychologists. The study analysed the impact of various teaching approaches, such as case studies, group discussions, mentoring, and the use of digital tools, on the development of professional skills in future professionals. It was found that such communication elements as non-verbal cues, active listening, and emotional interaction are crucial for building effective interaction between a specialist and their clients. The findings showed that practice-oriented methods, such as role-playing and mentoring, greatly improved students' ability to express empathy, manage emotional states, and resolve conflicts, which are fundamental to successful professional practice. The study also found that digital platforms, including simulation programmes and webinars, can considerably improve the effectiveness of the learning process, especially in a remote format. However, the maximum effect was achieved only when such tools were combined with conventional forms of training, such as mentoring and group exercises. The findings of this study emphasised the significance of an integrated approach to the training of future psychologists, where it is necessary to develop both emotional sensitivity and professional interaction skills. The practical significance of this study lies in the identification of effective educational approaches that contribute to the development of key interaction and communication skills in students preparing for professional activities in the field of psychological counselling

■ **Keywords:** emotional intelligence; active listening; empathy; professional interaction; emotional competence; professional growth

### ■ Introduction

Social communication has become an integral part of professional activity, especially for counselling psychologists. Effective interaction with clients requires a strong level of interpersonal skills, which are developed not only through theoretical training but also through practical social interactions. In the context of the growing complexity of social relations, there is a need to investigate more deeply how social communications affect the development of these skills in future

professionals. The relevance of this study is conditioned by the fact that conventional teaching methods do not always provide a sufficient level of preparation of students for the real challenges of the profession.

T. Anderson *et al.* (2020) found that modelling therapist responses through structured practice increased facilitative interpersonal skills in psychology students. This suggests that the integration of active social communication into the educational process could

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positively influence professional development. Furthermore, K.K. Sacco & K.E. Amende (2021) investigated the use of creative means for expressive self-reflection among future counsellors. Their findings revealed that creative methods encouraged students to deepen their self-knowledge and improved their ability to empathise, a key component of interpersonal skills. Creative expression in a social context contributed to the development of more flexible communication strategies, which was essential when working with various clients. On the other hand, T. Mösler *et al.* (2022) focused on reflective skills, empathy, well-being, and resilience in cognitive behavioural therapy students who took part in mindfulness-based self-reflection practices. The researchers concluded that these practices not only increased empathy but also contributed to the overall psychological well-being of the students. This emphasised the role of inner work and social interaction in the development of professional competence. The study by S.H.W. Chan *et al.* (2021) demonstrated the impact of mindfulness-oriented cognitive therapy on self-efficacy in counselling. The findings showed that mindfulness approaches could increase students' confidence in their professional skills, which was vital for effective social interaction with clients. The increase in efficiency contributed to more open and confident communication, which improved the quality of counselling.

L.S.A. Peixoto *et al.* (2021) analysed the impact of mindfulness interventions on emotional regulation, stress, and well-being in academic education. The researchers found that mindfulness helped to reduce stress and improve emotional regulation, which indirectly influenced the development of interpersonal skills. The ability to manage one's personal emotions was critical for building effective communications with clients. C.E.Jr. Watkins & L.J. Schneider (2020) emphasised the value of research in the field of counselling, addressing the role of social communication in the professional development of counselling psychologists. The researchers stressed the importance of continuous improvement of communication skills through research and practice. This pointed to the fact that continuing education and involvement in the professional community are essential for the development of competence. Another noteworthy study was conducted by E.M. Samfira (2020), who examined the development of assertive communication skills in universities. The researcher showed that the development of assertiveness contributed to more effective social interaction and prepared students for professional challenges. Assertiveness enabled future counselling psychologists to set clear boundaries and communicate their thoughts and feelings effectively. E. Heinonen & H.A. Nissen-Lie (2020) performed a systematic review of professional and personal characteristics of effective psychotherapists. The researchers concluded that personal qualities, such as empathy and the

ability to communicate effectively, are crucial for successful therapeutic practice. This emphasised the need to develop not only technical knowledge but also personal skills through social interactions.

The experience of L. Cronin *et al.* (2020) in studying the development of life skills in physical education through the lens of self-determination theory indicated that autonomy and social support were key factors in the development of interpersonal skills. Although their study focused on physical education, the principles can be applied in the context of psychological education. Providing students with opportunities for independent decision-making and social support contributed to their professional growth. B. Thornhill-Miller *et al.* (2022) discussed the significance of 21<sup>st</sup>-century skills, such as creativity, critical thinking, communication, and collaboration. The researchers emphasised that the assessment and promotion of these skills are critical to education and future employment, making them relevant to counselling psychology education. The integration of these skills into the curriculum increased the adaptability and effectiveness of future professionals in changing social settings.

Despite the valuable contribution of these studies to the understanding of certain aspects of interpersonal skills development, there is still a gap in the comprehensive study of the role of social communication in this process for future counselling psychologists. Most studies have focused on individual methods or contexts, without considering the systemic impact of social communication in the educational process. The absence of a holistic approach to the integration of social communication left open the question of which methods were most effective and how they could be implemented in educational programmes. In this regard, this study was aimed at an in-depth investigation of the role of social communication in the development of interpersonal skills in psychology students. The key research questions were as follows: how social communications influence the development of interpersonal skills in future counselling psychologists and what methods of their implementation are most effective. The purpose of this study was to identify and analyse effective training methods that promote the development of communication skills in psychology students preparing for professional work with clients.

## ■ Materials and Methods

The methodology of this study was based on the use of a systematic approach, which enabled a comprehensive examination of the role of social communications in the development of interpersonal skills of future counselling psychologists. Based on the tasks set, the study was conducted through the systematic processing of various materials and sources that reflect the development of the communication sphere in the context of training future psychologists. The use of social

communications in the training of future psychologists has become the subject of a comprehensive analysis, since not only the quality of interpersonal interactions, but also the overall effectiveness of the future specialist's professional activity depends on the level of these communications.

The key concepts and structure of social communications were identified, including both interpersonal interactions and the influence of external factors such as curricula, educational trainings, and the role of media and technology. This helped to outline the context in which social communication becomes practical for the development of interpersonal skills, such as empathy, active listening, and the ability to interact verbally and non-verbally with others. An in-depth analysis of the scientific literature on social communications and their impact on the development of interpersonal skills was conducted (Chigwedere *et al.*, 2021; Li *et al.*, 2022; Perlman *et al.*, 2023). The following criteria for selecting sources were used in the literature analysis: the relevance of publications, the availability of peer review, and relevance to the research topic. A selective search of sources in the Scopus, Web of Science, and Google Scholar databases was conducted using keywords including "social communication", "interpersonal skills development", "psychologist training". This provided a comprehensive overview of modern approaches to the development of interpersonal skills of future psychologists.

The method of analysis helped to identify the key concepts, approaches, and theories on the development of communication skills in psychological training, as well as to determine the most effective teaching methods that contribute to the development of these skills. The synthesis of the information obtained helped to summarise the previous findings and establish significant links between social communication and the professional competence of future psychologists. The induction method was used to draw conclusions based on concrete data collected during the study of various educational programmes and trainings aimed at training psychologists. Specifically, the use of social communication in practical classes and group training was analysed. The method of deduction was used to test the hypothesis that the integration of active social communication into the educational process contributes to the development of interpersonal skills. At the next stage of the study, the collected data were systematised by topic and areas of influence of social communications on the development of key skills of counselling psychologists. The generalisation of the findings helped to identify the key aspects that contribute to the development of empathy, active listening, non-verbal communication, and conflict management skills. Conclusions were drawn regarding the combination of conventional and modern teaching methods, including the use of digital technologies.

## ■ Results

Social communication is a complex process of information exchange between individuals, groups, or institutions through various channels, such as verbal and non-verbal communication, media, and digital technologies. The primary purpose of social communication is not only to transmit information, but also to ensure mutual understanding, which influences the formation of social relationships, behaviour and interaction. An essential aspect is how social communication affects the development of interpersonal relationships in a professional context, particularly in the field of psychology. For instance, in training programmes for future psychologists, special attention is paid to the use of social communications to develop empathy, active listening, and emotional intelligence. This is accomplished through trainings and workshops that simulate real-life situations of interaction with clients, enabling students to immerse themselves in the communication process and learn different interaction strategies.

Social communications also serve as an intermediary between diverse social groups, creating opportunities for the exchange of experience, knowledge, and ideas, thereby promoting greater collaboration and cooperation in the professional sphere. For instance, the integration of digital technologies, such as online video communication platforms, chatbots, and specialised psychological counselling software, greatly enhances communication opportunities (Shorey *et al.*, 2020). This enables professionals to maintain close contact with clients even over long distances by providing advice through online channels. This approach contributes to the development of communication skills in future psychologists and enables them to actively interact with various categories of clients in the modern digital environment.

One of the key elements of social communication is non-verbal means, such as gestures, facial expressions, intonation, and posture, which play a key role in establishing and maintaining mutual understanding during professional interaction between psychologists and clients. These aspects of communication help future professionals to better understand the emotional state of the interlocutor, which helps them build trusting and open relationships. The study of non-verbal aspects of communication is a vital component of psychologists' training, as these elements substantially affect the effectiveness of professional activity. For example, in their studies, future psychologists learn to recognise clients' facial reactions, which helps them better interpret emotions and adjust their approaches to conversation. Social communication is crucial in educational and professional contexts, where it serves as a means of communicating information and ideas between educators and students, as well as between professionals in their community. Effective social media not only facilitate the transfer of information, but also create favourable conditions for interaction between participants

in the learning process, increasing their engagement and motivation to learn.

In the study of social communication, there are several key theories and concepts that explain how information is exchanged between individuals, groups, and social institutions (Table 1). One of the central theories is the theory of communicative action, which focuses on people's desire for mutual understanding in the

communication process (Fuller *et al.*, 2021). According to this concept, the purpose of communication is to achieve a mutual understanding and coordination of actions, which is crucial in professional activities, particularly in the field of psychology. This is well illustrated during counselling, where psychologists apply their communication skills to reach mutual understanding with clients and help them solve their problems.

**Table 1.** Key theories and concepts of information exchange

Theory/Concept	Description	Example of application in the profession of counselling psychologists
Theory of communicative action (Jürgen Habermas)	Information exchange is aimed at achieving mutual understanding and coordination.	Used in psychological counselling to establish a dialogue with the client.
Theory of information redundancy	The effectiveness of communication is enhanced by repetition, detail, and clarification.	Psychologists use additional explanations or repeat key points for better understanding by the client.
Theory of social constructivism	People form their perceptions of reality through social interactions and communications.	Psychologists help clients reconsider their perception of life situations through dialogue.
Theory of cognitive dissonance (Leon Festinger)	People tend to avoid discomfort due to conflicting knowledge or beliefs.	Used by psychologists to help clients resolve internal conflicts and change behaviour.
Theory of uncertainty in communications	People seek to reduce uncertainty in new communication situations.	Psychologists help clients overcome uncertainty in communication, e.g., in new social groups.
Theory of exchange (Peter Blau)	Social interaction is based on a mutually beneficial exchange of resources (information, emotions).	Psychologists use it to maintain a balance in the therapeutic relationship.
Theory of structural functionality	Social institutions maintain stability and coordination in society through the exchange of information.	Used in counselling practice to understand the role of family, school, and other institutions in a client's life.
Theory of symbolic interaction (George Herbert Mead)	People interact based on the meanings they attach to symbols, gestures, and words.	Psychologists help clients understand non-verbal signals in interpersonal communication.

**Source:** compiled by the author based on N. Grover *et al.* (2021), M.R. Perlman *et al.* (2023)

Another significant concept is the theory of information redundancy, which states that the effectiveness of communication depends not only on the transmission of necessary information, but also on redundant elements such as repetition, clarification, or detail. This theory is extremely relevant in the work of counselling psychologists, where clarity and depth of information exchange are critical. Repeating and clarifying information during counselling sessions allows for a better understanding of the client's feelings and ensures that the psychologist correctly interprets their emotions and needs. The theory of social constructivism also plays a major role in understanding social communications. According to this theory, reality is created through social interaction, and people constantly "build" their understanding of the world based on communication processes. For counselling psychologists, this concept becomes relevant as their work is aimed at helping clients to reconsider their perceptions of situations and events that affect their emotional state. Through communicative interaction, the client gets the opportunity to rethink their problems and form a new vision of the situation. The concept of cognitive dissonance is also considered an important theory in social communications. It states that people seek to avoid psychological discomfort that arises from conflicting or contradictory knowledge and beliefs. In the professional work of psychologists, this theory helps to understand how

communication can influence changes in client behaviour or thinking. By using communication techniques, psychologists help clients overcome internal conflicts and achieve harmony in their perception of themselves.

Social communications play a key role in the development and maintenance of social relations, the development of society, and ensuring interaction between its members. Communication is the primary tool for exchanging information, knowledge, and ideas, which contributes not only to individual development but also to social integration. For instance, within public organisations and institutions, there is a constant exchange of opinions and views that influences the development of social norms, values, and collective decisions (Amari, 2021). In the political context, social communication is the basis for dialogue between government institutions and citizens, which ensures the democratic process. A prominent example is election campaigns, where citizens have access to a variety of opinions through the media and social media, enabling them to form their personal opinions and make decisions. Social communications also play a role in the socialisation process, where they help individuals adapt to existing social rules and norms. For example, in schools and educational institutions, communication between students and educators contributes not only to the transfer of knowledge, but also to the development of social competence, the ability to cooperate, resolve conflicts, and

establish connections (Morales-Rodríguez *et al.*, 2020). This is particularly relevant for professions that require a prominent level of interaction with people, such as psychologists, counsellors, and healthcare professionals. Social communication is also integral to economic development, as the effective exchange of information ensures the functioning of markets, increases productivity, and helps businesses better understand the needs of their customers. For example, companies use communication strategies to promote their products and services, interact with partners, and maintain their corporate culture. Successful businesses actively use social media to communicate directly with consumers, which enables them to receive feedback and improve their products or services in line with market needs.

In crisis situations, such as natural disasters or pandemics, the role of social media becomes even more critical. Through media and government channels, citizens receive valuable information about threats, safety measures, and support, which allows them to respond quickly to events and reduce social tensions. For example, during the COVID-19 pandemic, social media was instrumental in informing the public about quarantine measures, vaccinations, and medical advice, which helped control the spread of the virus. Interpersonal skills are the foundation of the professional activity of counselling psychologists, as they ensure effective interaction between the specialist and the client. One of the key skills is the ability to establish trusting contact with the client, which is crucial for the therapy process (Brown *et al.*, 2021). Without creating an atmosphere of trust and safety, the client may not confide in the therapist completely, which complicates the work on solving their psychological problems. Psychologists who have an elevated level of interpersonal skills can create a comfortable environment where the client feels supported and ready to cooperate. This is reflected, among other things, in the psychologist's ability to listen to the client without interrupting, giving them the opportunity to express their thoughts and emotions.

One of the most striking examples of the effective use of interpersonal skills is the work with clients who are dealing with traumatic events. In such cases, a counselling psychologist must display empathy – a profound understanding of the client's emotional state, which helps to create a supportive environment for working with distressing experiences. Empathy is a crucial tool as it facilitates the emotional connection between the psychologist and the client, helping the latter to feel understood and supported (Perryman *et al.*, 2021). This is particularly important during crisis counselling, where the client may be in a state of severe emotional stress. Another valuable interpersonal skill is the ability to ask open-ended questions that allow the client to reveal their thoughts and feelings more thoroughly. A psychologist must not only formulate such questions, but also be able to hear what is behind them, to notice

non-verbal signals that can reveal more than what the client says. For example, psychologists working with adolescents often use open-ended questions to encourage self-reflection, helping them to better understand their feelings and problems. Furthermore, conflict management skills play a major role, as counselling psychologists often work with clients who are experiencing internal or external conflicts. In such situations, a specialist should help the client understand the causes of the conflict, develop strategies for resolving it, and support the client in the process of changing behavioural patterns. For example, when working with married couples, psychologists often use techniques to help each partner express their needs and find a compromise.

When training future counselling psychologists, special attention is paid to the development of key components of interpersonal skills that ensure effective interaction with clients. One of these components is empathy – the ability of a specialist to feel and understand the emotional state of another person (Cooper *et al.*, 2020). Empathy enables psychologists to immerse themselves in the client's experience, creating a sense of support and security. This is crucial in the counselling process, as the client feels understood and open to dialogue. For example, when working with clients who are experiencing loss or trauma, a psychologist's empathy contributes to the emotional release and healing process. Active listening is another essential component of interpersonal skills. This process involves not only passive perception of information from the client, but also active engagement of the psychologist in the dialogue. Future psychologists learn not only to listen, but also to understand the context of what the client is saying, paying attention to details and emotional tones. For example, during training sessions, students practice using paraphrasing and mirroring techniques to help clients become more aware of their emotions (Waalkes *et al.*, 2024). This helps to establish a trusting connection and contributes to a deeper understanding of the problem. Non-verbal communication, such as facial expressions, gestures, posture, and eye contact, is also a significant aspect of training future psychologists. These elements help to reinforce verbal communication or, conversely, to reveal hidden emotions of the client that are not always conveyed in words. For example, in situations where a client cannot openly express their feelings due to fear or shame, non-verbal cues, such as a change in voice tone or avoidance of eye contact, can give the psychologist more information about the client's emotional state.

During their training, students of psychology undergo special training to develop non-verbal sensitivity, which helps them to interpret non-verbal signals during consultations more accurately. Other components of interpersonal skills include the ability to maintain a neutral stance and tolerance for different views and values of clients. Future counselling psychologists learn not to

judge or criticise clients for their choices, creating an atmosphere of non-judgemental support where clients can openly express their thoughts and feelings. This is essential when working with people from diverse cultural or social backgrounds, which requires flexibility and understanding of individual client characteristics. The training of modern counselling psychologists faces a series of challenges that require the adaptation of curricula to rapidly changing social, technological, and professional conditions. One of the greatest challenges is the need to continuously integrate modern technologies into the practice of psychological counselling. Students must not only study the conventional methods of psychological help, but also learn how to work with online consultations, digital platforms, and tools for remote work with clients. For example, the COVID-19 pandemic and the full-scale war in Ukraine have revealed the value of remote work for psychologists, which has led many educational institutions to include training in the use of video conferencing, chats, and specialised platforms for conducting therapy at a distance in their training programmes.

Another challenge is the development of psychologists' intercultural competence. In the modern world, where increasing attention is being paid to multiculturalism and diversity, future psychologists must be prepared to work with clients from diverse cultural, religious, and social backgrounds. This requires not only knowledge about the characteristics of various cultures, but also the ability to adapt their methods of work to accommodate these differences. For example, psychologists working with immigrants or refugees must consider their traumatic experiences and specific cultural barriers that may affect the therapy process. Another challenge is the increasing number of psychological problems faced by clients in modern society. Future professionals must be prepared to handle new forms of stress associated with the fast pace of life, social media, information overload, and general instability in the world (McMahon & Rodillas, 2020). Technological changes, global crises, and the threat of economic turmoil put extra pressure on people's mental health, which increases the need for qualified psychological help. For example, the number of requests for help with anxiety disorders, depression, and social isolation is growing, which has become particularly acute following the COVID-19 pandemic, which caused severe emotional stress among people around the world.

The war in Ukraine, which has caused severe psychological trauma among the population, is yet another factor that creates challenges for psychologists. Psychologists should be prepared to work with post-traumatic stress disorder (PTSD), anxiety, depression, grief, and loss, as well as with the problems of social adaptation for internally displaced persons (IDPs), refugees, and veterans. People affected by war often face chronic stress, which affects not only their mental but also their

physical condition. Future psychologists should be prepared for such challenges and have the knowledge and skills to work with such clients. For many Ukrainians, the war has become a source of complex psychological trauma, which manifests itself through fear, anxiety about the future, and a sense of loss of stability and security. This requires counselling psychologists not only to have a comprehensive understanding of trauma-related psychological processes, but also to adapt therapeutic methods to the unfamiliar environment, including crisis counselling, group therapy, and long-term support for war victims. In the context of war and other global crises, psychologists play a critical role in helping society recover from the consequences of these catastrophic events. The requirements of modern psychological training also include an emphasis on the development of personal and emotional resources of the specialists themselves. Future counselling psychologists must be capable of managing their emotions and maintaining their mental health at a sufficient level to avoid professional burnout. This requires the inclusion of courses aimed at developing self-regulation skills, meditation, and emotional stability in the curriculum (Perlman *et al.*, 2020). In this context, the role of supervision becomes vital, where students can discuss their emotional state and the challenges, they face in the training process.

Social communication is a powerful tool for developing interpersonal skills, especially in the context of training future counselling psychologists. They provide a platform for interaction that helps future professionals improve their communication skills, emotional flexibility and ability to adapt to different situations. For example, participation in group discussions and practical exercises allows psychology students to train their skills of active listening, asking the right questions and expressing empathy in real-life situations. This is particularly relevant in the context of preparing for professional work, as such skills are the foundation for effective work with clients. One of the key elements of social communication is the ability to establish contacts and maintain dialogue in various social contexts. Psychology curricula actively employ such methods as role-playing and simulation of real counselling sessions, which helps to develop self-confidence and communication skills (Chapman-Hilliard & Parker, 2022). Students can gain experience in interacting with various types of clients, including those who may be resistant or avoid discussing sensitive topics. Through such teaching methods, future psychologists learn how to maintain open and honest communication, which is crucial for establishing trusting relationships with clients.

Social media and digital platforms also play a major role in developing interpersonal skills. For instance, online training and webinars allow students to gain new knowledge and practice their communication skills remotely. The use of video conferencing, chats,

and forums helps future psychologists to master communication skills in a digital environment, which is extremely useful in the modern context where remote consultations have become commonplace. Furthermore, social communication contributes to the development of conflict management and critical thinking skills. In the training of psychologists, a prominent aspect is learning how to resolve conflict situations that may arise during consultations. For example, training in mediation or negotiation techniques helps students learn to identify sources of conflict and find ways to resolve them constructively. This allows psychologists not only to work more effectively with clients, but also to better manage their emotional reactions in complex situations. For future counselling psychologists, the development of interpersonal skills through social

communication forms an integral part of their professional training. There are several practical methods that help to improve these skills by integrating them into real-life communication situations and learning processes (Table 2). One of the most effective methods is role-playing. They allow psychology students to study complex scenarios of interaction with clients in a safe environment. For example, during the games, students can play the roles of both psychologists and clients, re-enacting various types of consultations. This helps them develop skills in active listening, empathy, and adaptation to the emotional needs of the client. Research shows that role-playing games improve students' ability to intuitively recognise emotions and resolve conflict situations that often arise during psychological counselling.

**Table 2.** Effectiveness of various practical teaching methods

Teaching method	Key skills developed	Benefits	Challenges
Role-playing games	Active listening, emotion management	Practice in a safe environment	Requires additional resources
Trainings with supervision	Consultative skills, feedback	Continuous feedback	Limited number of supervisors
Modelling of consultations	Response to crisis situations	Proximity to real-world conditions	Complexity of organisation
Virtual simulations	Recognition of non-verbal signals, stress management	Possibility of practising scenarios multiple times	Technical requirements, need for special software
Group discussions	Critical thinking and argumentation	Stimulates the exchange of ideas, develops teamwork	Requires a moderator, conflict of opinion may arise
Online consultations (remote work)	Communication skills in a digital environment	Preparation for the real conditions of remote work	Lack of physical presence, technical problems
Practical workshops and masterclasses	Skills of real therapeutic work	Gaining knowledge from experts, possibility of interaction	Limited number of participants

**Source:** compiled by the author based on C. Chigwedere et al. (2021), C.-S. Li et al. (2022)

Another valuable method is group discussions. They give an opportunity for students to interact with their peers and instructors, discussing different approaches to working with clients. By exchanging ideas, students can improve their communication skills by arguing their positions and learning to accept other opinions. Group discussions also help to develop critical thinking, which is essential for making the right decisions in counselling. For example, when discussing complex cases from clinical practice, students learn how to formulate questions, analyse client behaviour, and give balanced advice. The use of video recordings of consultations is essential for improving non-verbal communication skills. Watching and analysing their personal and other people's sessions allows students to better understand how non-verbal cues affect the communication process. For example, analysing non-verbal behaviours such as gestures, facial expressions, and tone of voice can show students how a client reacts to certain topics or situations. This allows future psychologists to improve their ability to read non-verbal cues and adapt their behaviour accordingly.

Furthermore, supervision is a crucial component of interpersonal skills development. This process involves students working under the supervision of experienced

psychologists who provide feedback on their work. Supervision helps students develop confidence in their communication skills as they receive professional advice on how to improve their interactions with clients. For example, a supervisor can help a student to solve a problem when they encounter difficulties in communicating with a client or point out weaknesses in communication strategies. Reflection allows students to analyse their communication successes and failures. After each consultation or training session, students are encouraged to write down their observations of the interaction with the client, including how the client reacted to their words, gestures, and how they felt during the interaction. This approach allows students to better understand what aspects of their communication need further improvement.

Integration of modern technologies into the teaching process for future counselling psychologists is an essential element of their professional training. Technological advances have substantially changed approaches to learning, enabling students to acquire knowledge and practical skills through a variety of digital tools. The use of such technologies not only improves the quality of the educational process, but also makes it more flexible and adaptive to the needs of the modern

world. One of the key examples is the use of distance learning platforms such as Moodle (n.d.), Canvas (n.d.), or Zoom (n.d.). They enable students to take part in lectures, seminars, and trainings in real time, regardless of their location. This is particularly relevant in the context of distance education, which has become widely used after the COVID-19 pandemic. Furthermore, distance learning platforms promote the development of independent learning skills, as students have access to materials at any time convenient for them and can manage their learning process.

Another significant tool is virtual simulators and online simulations of counselling sessions. This approach allows students to develop confidence in their skills and abilities before they start real practice, as well as receive feedback from teachers and colleagues on their actions. Online trainings and webinars are also becoming principal elements in the training of future psychologists. Thanks to them, students can gain knowledge from experts around the world, take part in masterclasses and seminars without leaving their educational institution. For instance, during webinars on crisis counselling or working with PTSD, students can receive practical advice on how to work with clients who have experienced traumatic events. This enables future professionals to expand their knowledge and improve their practical skills in working with diverse types of clients.

Furthermore, the use of artificial intelligence (AI) in the training of future psychologists opens new horizons for the integration of modern technologies into the educational process. For example, AI-based systems can analyse student responses, provide feedback, and suggest individualised ways to develop skills. This helps students receive more personalised support in the learning process. The integration of digital platforms for documentation during psychological sessions is equally important. The use of such tools allows future professionals to organise their work more efficiently by storing records of consultations, creating therapy plans, and tracking client progress. Platforms such as SimplePractice (n.d.) or TheraNest (n.d.) are already widely used in professional practice, and their application in the educational process allows students to transition from study to real work more easily. It is also worth mentioning the value of developing social media skills. Social media is an indispensable tool for psychologists to build their professional brand and interact with clients. Future counselling psychologists should learn how to use social platforms to provide information support to clients, promote their services, and even conduct consultations through secure communication channels.

## ■ Discussion

The findings of this study indicate the important role of social communication in the development of interpersonal skills of future counselling psychologists. The data obtained demonstrate that social communication

contributes to the development of empathy, active listening and conflict management – skills necessary for the effective work of psychologists with clients. The value of these findings is confirmed by the research of other experts who investigated the role of social communication and interpersonal skills in the professional activities of psychologists. For example, J.T. Quaglia *et al.* (2022) pointed out the significance of compassion and empathy in the work of counsellors, emphasising that these skills contribute to the creation of trusting relationships with clients. The findings of both studies suggest that social media is an effective tool for developing these key skills in a professional environment. Another interesting discovery concerns the role of digital technologies in the training of psychologists. The study showed that the use of online platforms and simulations helps students improve their communication skills and prepare for real counselling sessions. These findings correlate with those presented by T. Blakemore & K. Agllias (2020), who examined how social media influences the development of empathy and interpersonal skills in students preparing to become social workers. They found that digital technologies can contribute to the development of social and emotional skills, but their effectiveness depends on how these technologies are used in the educational process. The present study confirmed these findings, pointing to the significance of integrating technology into psychology curricula. This study also confirmed the significance of conflict management in counselling. T. Blakemore & K. Agllias noted that conflict management skills can be effectively developed through group discussions and social media. However, the present study highlighted that the most effective method is mediation training, where students learn to resolve conflict situations in the format of role-playing games. This allowed students to be better prepared to work with clients experiencing internal or external conflicts.

Non-verbal communications, including facial expressions, gestures, and posture, also play an essential role in the development of psychologists' interpersonal skills. They are an important complement to verbal communication, helping professionals to interpret the emotional state of clients more accurately. This is especially noticeable when working with clients who cannot openly express their feelings due to psychological barriers or traumatic experiences. In such situations, non-verbal cues become a key source of information for the psychologist, enabling them to build a deeper understanding of the client's internal state. R. Elliott *et al.* (2023) in their systematic review found that empathic reflections, albeit a valuable tool for conveying an understanding of client experiences, were not always sufficiently effective when used in isolation. The researchers noted that successful communication requires a comprehensive approach that includes not only verbal reflections, but also the integration of

non-verbal cues such as gestures and tone of voice. The researchers also highlighted the significance of flexibility in the approach to empathic mirroring, which requires precise calibration to the client's non-verbal cues. The present study confirmed these findings, showing that teaching psychology students the non-verbal aspects of communication is essential for the development of their professional skills. For instance, the ability to promptly detect a subtle change in a client's facial expressions or posture helped the psychologist to adjust their approach in real time, which increased the effectiveness of the therapeutic interaction. Thus, non-verbal communication is an indispensable component of complex empathy and supports the development of a trusting relationship between psychologist and client.

A significant aspect of this study is the development of intercultural competence of future counselling psychologists. In the modern globalised world, professionals must be equipped to work with clients from diverse cultural and social backgrounds. Y. Liu *et al.* (2022) showed that mutual empathy developed through group activities greatly improves students' ability to communicate interculturally. The findings of the present study confirmed this approach, emphasising the importance of intercultural competence in the profession of psychology, especially when working with immigrants or refugees. Practical training under the guidance of supervisors helped to develop students' confidence and professional competence. Supervision provided an opportunity to receive feedback from experienced professionals, which helped students to adjust their approaches to working with clients in a timely manner and improve their communication and therapeutic skills. R.R. Harris (2022) noted that the emotional intelligence and awareness of psychologists directly influenced the level of stress they experienced during their studies and work. Her study showed that the higher the level of emotional intelligence of psychologists, the lower the level of stress, which helped them to perform their duties more effectively and maintain emotional stability. The present study was consistent with these findings, demonstrating that supervision helped to reduce students' stress levels and contributed to the development of their emotional and professional skills. During supervision, students were given the opportunity to handle demanding situations in a controlled environment, which reduced their anxiety levels and increased their effectiveness in counselling. Practical training with supervision helped students to better understand their emotional reactions to stressful situations and to develop strategies for managing stress.

At the same time, some aspects of this study differ from the findings of previous research. For example, S. Kim *et al.* (2021) found that emotional learning programmes and mindfulness training can considerably

reduce the level of teacher burnout. Their study showed that such programmes helped teachers to better understand their emotional reactions, reducing stress levels and improving overall well-being. However, the present study indicated that for counselling psychologists, these programmes are only effective when combined with other training methods, such as group discussions, role-playing, or practical simulations of counselling sessions. This suggests that training psychologists is a more complex process that requires a multicomponent approach, where not only emotional development but also the development of communication and practical skills must be considered. Role-playing games and group discussions gave students the opportunity to interact with colleagues, analyse various situations with clients and learn how to respond to their emotional signals. This allowed them to combine theoretical knowledge with practical experience, which is crucial in training psychologists who will work with diverse types of clients in complex life situations in the future. Thus, psychologists need to dedicate more time to the development of communication skills and the ability to manage the emotions of their clients.

The findings of the present study showed that emotional learning programmes and mindfulness training can be useful for psychologists only in combination with other interactive training methods. This emphasised the significance of an integrated approach to training future professionals, which included both the development of emotional competence and practical skills in interacting with clients. Overall, the findings of this study confirmed the relevance of an integrated approach to the training of future counselling psychologists, where social communication, practical training, and technology were integrated to develop key skills. This was in line with the findings of other researchers who pointed to the significance of multiple approaches in training. For example, R. Kimball & D. Daniel (2020) emphasised the role of reflective writing in developing students' cognitive complexity, which coincides with the findings of the present study regarding the need for self-reflection and analysis of future psychologists' behaviour.

The study found that social communication has a decisive influence on the development of interpersonal skills in future counselling psychologists. Both verbal and non-verbal aspects of communication play a significant role in this process, which is confirmed by the outcomes of trainings and group interactions. The use of modern technologies and interactive teaching methods, such as role-playing and simulation of consultations, helps to increase students' confidence in professional skills. It was found that a comprehensive approach to training that combines emotional preparation with practical skills is most effective. The study also showed that supervision reduces stress and supports the development of students' emotional competence.

## ■ Conclusions

The study identified a series of key aspects related to the role of social communications in the development of interpersonal skills of future counselling psychologists. Specifically, it was found that effective training of psychologists requires a multicomponent approach that includes not only the development of emotional competence, but also the development of communication and practical skills. Social communications played a crucial role in this process, as they contributed to creating conditions for effective interaction between psychologist and client, which underlies successful therapeutic practice. The findings of the study confirmed that the use of such methods as role-playing games, group discussions, and supervision are effective tools for developing the communication skills of future psychologists. These methods enabled students not only to acquire the necessary professional skills, but also to better understand their emotional reactions and stress management strategies when working with clients.

The findings of this study indicate a positive effect of social communications on the development of key interpersonal skills in psychology students. Specifically, the study recorded improvements in such skills as active listening, empathy, conflict management, and non-verbal communication. Furthermore, the study revealed the vital role of digital technologies in psychologists' education. The use of online platforms, simulations, and webinars has enabled students to acquire new knowledge and practical skills regardless of their location, which increases the flexibility of the learning process. This is especially true in the context of distance learning, which has become necessary due to the COVID-19 pandemic and the war in

Ukraine. However, digital tools are only effective when combined with practical training under the supervision of supervisors or teachers. Based on the study conducted, several practical recommendations can be made to improve the training of future psychologists. Educational institutions should pay more attention to the integration of practical teaching methods, such as role-playing and supervision, as they are effective tools for developing professional skills. Digital technologies should be more actively introduced into the educational process, especially in the context of distance learning. The combination of conventional and online learning methods will ensure flexibility and accessibility of educational programmes. However, despite the positive findings, the study has certain limitations. One of them concerns the theoretical framework of the study, which limited the analysis to only certain aspects of social communications and psychology training. Future research should expand the range of research methods, particularly by focusing on the interaction of diverse approaches to training. Further research should also focus on the development of tools for assessing the effectiveness of various teaching methods, especially in the context of digital technologies. Examining how the integration of AI and virtual simulations can contribute to the development of empathy and communication skills in future psychologists could be a major step towards improving the educational process.

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## ■ Conflict of Interest

None.

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## Роль соціальних комунікацій у розвитку міжособистісних навичок у майбутніх психологів-консультантів

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■ **Анотація.** Метою проведення даного дослідження було з'ясувати, як соціальна взаємодія сприяє формуванню ключових навичок спілкування у студентів психологічних спеціальностей та визначити ефективні освітні методики, що допомагають цьому процесу. Методологія дослідження ґрунтувалася на системному підході, що дало змогу глибоко дослідити, як соціальні комунікації сприяють розвитку міжособистісних навичок майбутніх психологів-консультантів. У ході дослідження було проаналізовано вплив різних підходів до навчання, таких як моделювання ситуацій, групові обговорення, наставництво та впровадження цифрових інструментів, на розвиток професійних умінь у майбутніх фахівців. Було встановлено, що такі елементи комунікації, як невербальні сигнали, активне слухання та емоційна взаємодія, є надзвичайно важливими для побудови ефективної взаємодії між спеціалістом і його клієнтами. Результати свідчать про те, що методи, орієнтовані на практику, такі як рольові ігри та наставництво, значно покращували здатність студентів до виявлення емпатії, управління емоційним станом та вирішення конфліктів, що є основоположними для успішної професійної діяльності. Дослідження також показало, що цифрові платформи, включаючи симуляційні програми та вебінари, можуть значно підвищити ефективність навчального процесу, особливо у віддаленому форматі. Однак, максимальний ефект досягався лише за умови поєднання таких інструментів із традиційними формами підготовки, такими як наставництво та групові вправи. Підсумки дослідження наголосили на важливості інтегрованого підходу до підготовки майбутніх психологів, де необхідно розвивати як емоційну чутливість, так і професійні навички взаємодії. Практичне значення даного дослідження полягає у визначенні ефективних освітніх підходів, що сприяють формуванню ключових навичок взаємодії та спілкування у студентів, які готуються до професійної діяльності у сфері психологічного консультування.

■ **Ключові слова:** емоційний інтелект; активне слухання; емпатія; професійна взаємодія; емоційна компетентність; професійне зростання



## Features of professional training of future specialists in education for children with special needs

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■ **Abstract.** The study aimed to determine the specifics of professional training of future specialists in education for children with special needs. The methodology included student practice, questionnaires, teacher observation and SWOT analysis of forms of work with children with special needs. The study obtained data on the effectiveness of various forms of work with children with special needs in the practical training of students of pedagogical specialties. A systematic comparison of students' self-assessment of professional knowledge and skills with the assessments of mentor teachers was conducted, which was used to identify both objective progress and subjective differences in assessments. The data shows a significant improvement in the level of theoretical knowledge, practical skills, communication competencies and motivation of students. The SWOT analysis of the forms of work with children with special needs (individual and group lessons, use of multimedia technologies and pedagogical observations) provided a clear picture of their strengths and weaknesses, opportunities for improvement and potential threats. Pedagogical observations were noted to be effective in analysing student behaviour yet can be subjective. The results confirm that practical training of students significantly increases their readiness for professional activity. The study determined that the introduction of interactive forms of education, strengthening of the interdisciplinary approach and improvement of the material and technical base will contribute to greater efficiency of education for children with special needs. The research findings can be utilised by higher education institutions to improve the training of future professionals working with children with special needs, as well as by educational establishments to implement effective teaching methods and support for such children

■ **Keywords:** educational systems; multidisciplinary teams; interpersonal interaction; innovative methods; inclusive approach

### ■ Introduction

The professional training of future professionals in education for children with special needs is an important area in the development of educational systems, as it provides adequate support and an inclusive environment for such children. The education of these specialists should include not only special pedagogical and psychological knowledge but also interpersonal skills and the ability to adapt the learning process to the individual needs of students. Given the diversity of types of special needs, professional training should consider

various aspects: from defectology and psychological and pedagogical correction to the use of innovative methods and technologies to develop children's social and communication skills. It is also necessary to develop teamwork skills in future specialists, enabling effective solutions to complex problems associated with the integration of such children into the educational process. However, the problem of insufficient attention to an inclusive approach in teacher training, as well as the lack of a single standard for training specialists in this

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area, requires further research. The impact of different forms of training on practical results in working with children with special needs, as well as the role of technological innovations in the training of such specialists, remain unresolved.

Many researchers addressed the issue of the specifics of professional training for future professionals working with children with special needs. S. Ahmed *et al.* (2021) investigated teacher professional development for disability inclusion in low- and middle-income countries in Asia and the Pacific. The authors created a map of evidence and gaps to identify how professional development can promote inclusive learning in these countries. F. Hellmich & M. Loeper (2019) investigated peer attitudes towards children with special needs. The researchers aimed to determine the role of these factors in shaping children's perceptions of and interactions with peers with learning disabilities. Studies demonstrated that peers' attitudes towards children with special needs may depend on their experience of interacting with them and the influence of parental attitudes. Positive contact with children with disabilities and support from parents can lead to greater acceptance and understanding among peers, which improves their social inclusion. F. Hellmich *et al.* (2019) investigated the role of teachers' attitudes towards self-efficacy beliefs in shaping their daily practice in inclusive classrooms. The study tested the "theory of planned behaviour" as it relates to actions and approaches to inclusive education by exploring how teachers' beliefs about their abilities influence inclusive teaching practices. H. Jeon *et al.* (2022) examined the professional and psychological aspects of teachers' work with children with special needs. In particular, the authors studied the level of professional burnout and psychological stress that affect teachers working with children with special needs. The factors that contribute to stress, including heavy workload, the complexity of working with children with special needs, and insufficient support from colleagues and the education system were investigated. B. Devenish *et al.* (2023) investigated the effectiveness of professional development for staff working with students with disabilities and its impact on the use of evidence-based pedagogical practices in classrooms. J. Fernández-Batane-ro *et al.* (2022) investigated whether primary school teachers are prepared to use technology in teaching children with disabilities. They examined the level of teacher training and identified gaps in the curriculum. K. Forsling & C. Tjernberg (2023) studied how primary school teachers adapt literary practices for students with different learning needs, using flexible teaching approaches.

O. Fushtei *et al.* (2020) studied the psychological and pedagogical conditions for the development of professional competence of future social workers using the global Internet and innovative technologies

such as virtual reality, augmented reality and online learning platforms that provide opportunities for training and interactive courses, promoting the development of professional skills in real-time. A. Gentile *et al.* (2023) investigated how the COVID-19 pandemic has affected the resources of parents of children with special needs. Parents adapted to the new learning environment and the resources available to them. The above-mentioned authors have not yet investigated the long-term effects of technological support on the social integration of students with special needs, nor have they focused on comparing the effectiveness of different models of inclusive education. The studies have not covered the issue of financial and administrative barriers to access to quality education for children with disabilities. The study aimed to identify opportunities for improving the educational process and potential threats to their application by future professionals in working with children with special educational needs.

## ■ Materials and Methods

Three schools within the territory of the Fier Regional Administrative District were selected for the study, namely 4, 9-year schools in Gjirokastra, Fier and rural school in Lushnja. The study included 40 future professionals, including 31 women and 9 men, aged 31 to 35 years. At the initial stage of the study, an introductory training session was held to explain the specifics of working with children with special needs. Particular attention was devoted to an introduction to inclusive education methods, including the adaptation of teaching materials and the use of interactive technologies. Questionnaires were also developed to assess the student's initial level of professional knowledge and skills. The students completed a six-week internship at selected schools. Various education methods were used.

Individual lessons with children with special needs, including the development of communication and social skills. Group classes aimed at integrating children with special needs into the general environment. Use of multimedia technologies for learning, such as interactive presentations and adapted learning games. Pedagogical observations, during which students analysed the behaviour of children and their adaptation to the learning environment.

Before and after the internship, students filled out questionnaires to assess their professional level. The questionnaire was based on the following criteria: theoretical knowledge, which included comprehension of the basic concepts and principles of the profession, knowledge of methods and standards of work; practical skills, which included the ability to apply knowledge in professional situations, perform tasks related to the analysis and solution of practical problems; communication competencies, which included the effectiveness of interaction with colleagues, teachers,

clients or students, as well as the development of teamwork skills; level of motivation, which assessed the attitude to professional activity and readiness to work in a professional environment. The knowledge test was conducted on a 10-point scale, where 1 meant a very low level of knowledge and 10 meant a very high level. The assessment was based on specific criteria that was used to accurately determine the level of respondents' understanding of the material. This scale was used to obtain a detailed assessment of knowledge and identify the strengths and weaknesses of the test participants. A similar assessment of their professional knowledge and skills was carried out by the tutors. They recorded the students' progress using the same criteria, but their assessments were based on observations of the students' work during the practice, their interaction with children, and the overall effectiveness of the tasks. The study was conducted in compliance with ethical standards, including obtaining voluntary consent from participants and protecting their confidentiality and anonymity (The Declaration of Helsinki, 2013). This made it possible to obtain a more objective picture of changes in students' professional training. In particular, the theoretical basis for the study was provided by the research of such authors as H. Yuan (2023), M. Mi-thans (2023), F. Obiakor *et al.* (2024).

The SWOT analysis was used to assess the effectiveness of the forms of work with children with special needs used by students during the practice. Individual and group lessons, the use of multimedia technologies and pedagogical observations were analysed. For each form of work, the strengths and weaknesses, opportunities for improving the educational process and potential threats to their use were identified. The data for the analysis were collected through student questionnaires, teacher-mentor observations and analysis of practical work.

## ■ Results

For a deeper understanding of the concept of children with special educational needs, it is necessary to consider their classification. This category includes children with developmental disabilities that affect their ability to learn, communicate or socialise. By the nature of their disabilities, they are divided into several groups: children with visual, hearing, speech, musculoskeletal, intellectual, emotional and volitional disorders, as well as children with complex disabilities. Each of these groups has its specifics, which are factored into the professional training of specialists (Oliy-nyk, 2022). Children with visual impairments have a reduced or absent visual analyser, which affects their perception of the world around them. They are worked with using special techniques such as tactile perception training and audiovisual technologies. Children with hearing impairments need methods aimed at developing auditory perception, sign language and

lip reading. Children with speech impairments, such as stuttering or delayed speech development, need the help of speech therapists. Teachers who work with them learn remedial teaching methods that help develop speech, form correct pronunciation and expand vocabulary. Children with intellectual disabilities, who may have mild, moderate or profound mental retardation, require special attention. Teaching such children is aimed at developing adaptive skills, household independence, and stimulating cognitive processes (Tarantino *et al.*, 2022). Children with musculoskeletal disorders, such as cerebral palsy, require a comprehensive approach that includes physical rehabilitation, special gymnastics, adaptive physical education and training with the help of special equipment. There are also children with emotional and volitional disorders, such as autism spectrum disorders or hyperactivity. To teach them, behavioural therapy methods, emotional intelligence and social skills are crucial.

In the process of training specialists, considerable emphasis was devoted to the development of their ability to individualise learning. Every child with special needs has unique capabilities and limitations, so a teacher must be able to adapt the learning process to the needs of a particular child. To do this, it is necessary to learn how to create individual educational programmes, following the developmental features, abilities and interests of the child. Another important aspect of training is parental engagement. Parents of children with special needs often face difficult challenges, and therefore professionals should support them, advise on the upbringing and education of their child, and help them solve social and psychological problems. The professional training of future specialists to work with children with special needs is a multi-level process that includes mastering theoretical knowledge, gaining practical experience, developing emotional and psychological stability and forming ethical consciousness. Thanks to an integrated approach to training, specialists acquire the necessary competencies for teaching, contributing to the development, education and socialisation of children with various forms of disabilities.

Teaching children with special needs is a crucial aspect of modern pedagogy, requiring a distinctive approach, adapted methods and forms of teaching. In the context of inclusive education, the importance of forms of work increases significantly, as they determine not only the effectiveness of learning but also the level of socialisation and integration of children with special needs into society (Oliy-nyk, 2022). In the study conducted in schools in the territory of the Fier Regional Administrative District, various forms of education were used to assess their effectiveness in the context of modern pedagogy. These included individual lessons, group work, the introduction of multimedia technologies and pedagogical observations. The individual

form of education is one of the most effective for children with developmental disabilities, as it considers their characteristics, learning pace and level of training. In practice in schools in the territory of the Fier Regional Administrative District in individual lessons were aimed at developing communication and social skills in children with various disabilities. Classes were held according to specially designed programmes adapted to the needs of each child. For instance, visual materials, graphic diagrams and sign language were used for children with hearing impairments. In the case of children with mental retardation, the emphasis was on gradual, step-by-step learning with frequent repetition. Children with autism required consideration, for whom students created structured environments that considered their high level of sensitivity to external stimuli. Individual lessons allowed not only for effective learning but also for the development of social skills. For instance, one of the tasks was to teach children how to say hello, thank you, and ask for help, i.e., the basics of social behaviour. This approach improved communication between the children and their teachers and reduced anxiety, which is common among children with special needs. However, the practice also revealed some challenges. The biggest problem for the students was the preparation of individual programmes for children with complex disabilities. In such cases, it was necessary to consider several aspects at the same time: cognitive abilities, the child's emotional state, physical capabilities and ability to perceive information.

Teamwork is also important for the integration of children with special needs into the mainstream. In schools in the territory of the Fier Regional Administrative District, group activities were aimed at developing cooperation skills, social interaction and tolerance among students. One of the key benefits of group classes is the creation of an environment in which children with special needs can communicate with their peers and learn in a shared environment. The student interns organised interactive games, creative activities and group projects involving both children with special needs and their classmates (Hyseni Duraku *et al.*, 2021). For instance, during one of the classes, children created a collage on the theme "My favourite city" to promote teamwork, stimulate creativity, and ensure the inclusion of each participant. Group classes reduced the level of isolation of children with special needs. They experienced themselves as part of a community and became more open and confident. Organising group classes proved to be a challenge for the students. One of the main problems was that children with different forms of disabilities required different approaches, and it was not always possible to address all these features in one lesson. For instance, in groups with children with autism, there were sometimes difficulties due to their low tolerance to noise or difficulties in interacting with other children.

Modern technologies open new opportunities in education for children with special needs. In South Albania, schools actively employed multimedia technologies to create an interactive learning environment. Students used interactive presentations, educational games, videos, and specialised programmes that were adapted to the needs of children. For instance, children with visual impairments, used programmes with enlarged fonts and contrasting colours. For children with speech delays, audio and video materials were used to help improve speech activity. Adapted educational games that combined learning with entertainment proved to be particularly effective. They assisted children in learning the material better, as well as contributed to the development of cognitive skills, attention and memory. One of the games aimed at developing maths skills gave children the opportunity to solve problems in the form of an adventure story, which made them interested and eager to complete the task. The use of multimedia technology also had its challenges. Some children, especially those with sensory impairments or hyperactivity, could not always concentrate on the screen or interact with the computer properly. Certain technical devices required additional adaptation for children with complex disabilities, which required time and effort on the part of the students.

Pedagogical observations were an integral part of the practice, as they enabled students to analyse children's behaviour, their adaptation to the learning environment and their interaction with other participants in the educational process. During the observations, students recorded how children respond to different teaching methods, what challenges they face in interacting with peers and teachers, and what factors contribute to their successful adaptation. At a special education school in Saranda, students observed how children with autism adapted to the new learning environment and identified which strategies were most effective in reducing their stress levels. Observations also helped assess the effectiveness of the implemented methods and forms of work. After the introduction of interactive games, students noted an improvement in children's attention and interest, which confirmed the effectiveness of this approach. However, pedagogical observations also revealed some difficulties. The biggest challenge was that some children showed variable behaviour depending on conditions and factors such as mood, stress or physical well-being. This complicated the analysis and required a longer time for observation. To better understand the impact of the internship on students' professional development, a questionnaire was conducted, the results of which are summarised in Table 1. This table shows changes in the levels of theoretical knowledge, practical skills, communication competencies and motivation of students as assessed by the interns themselves and their teachers.

**Table 1.** Assessment of students' professional development before and after the internship: self-assessment and teacher evaluation

Criteria	Evaluation of student testing		Evaluation of teachers	
	Before practice	After practice	Before practice	After practice
Theoretical knowledge	6.2	8.5	5.8	8.2
Practical skills	5.8	8.2	5.5	8.0
Communication competences	6.5	8.9	6.0	8.5
Motivation level	7.0	9.1	6.8	8.8

**Source:** compiled by the author

According to the table, the results of the student's self-assessments and the teachers' assessments show significant changes in their professional skills and knowledge after the internship. An overall improvement in all aspects of professional training is evident, which demonstrates the effectiveness of the practice. Students' theoretical knowledge before the internship was assessed at an average level (6.2 on a 10-point scale). At the end of the internship, students reported a much higher level of knowledge (8.5), indicating a significant improvement in their understanding of the basic concepts and principles of working with children with special needs. The teachers' scores were slightly lower, from 5.8 to 8.2, which may indicate that students were more optimistic about their knowledge than teachers. The increase in scores by both students and teachers confirms that theoretical knowledge has improved. Practical skills also showed a significant improvement. Students rated their practical skills at 5.8 before the course and 8.2 afterwards, indicating a significant improvement in their ability to apply knowledge in practice. Teachers rated this progress from 5.5 to 8.0, which also confirms the improvement in practical skills. The difference between the students' and teachers' scores, although slight, may reflect different levels of self-criticism: students tended to be more self-assessing, while teachers made more objective conclusions based on observations. In terms of communication competencies, students reported a significant improvement in their communication skills, with scores ranging from 6.5 to 8.9. This indicates

an increase in the effectiveness of interaction with students, colleagues and teachers, as well as the development of teamwork skills. Teachers rated the changes in students' communication skills from 6.0 to 8.5, which also confirms the improvement in this area, although the teachers' score was again slightly lower, which may indicate a more reserved assessment by teachers who have more grounds for objective evaluation. As for the level of motivation, students rated their attitude to the profession at 7.0 before the internship, and after it was completed, this indicator increased to 9.1, which indicates a significant increase in motivation and readiness to continue professional development. Teachers rated students' motivation from 6.8 to 8.8, which also confirms the increase in motivation, although with a slightly smaller increase compared to students' self-assessment.

A significant improvement was observed in all assessed aspects of students' professional training, including theoretical knowledge, practical skills, communication competencies and motivation. The teachers' assessments were slightly lower than the students' self-assessments, indicating that they were more objective in their assessment of progress. This may indicate that students rated themselves higher than they were, which is typical for self-assessment, especially in the context of such an intensive experience as practical work with children with special needs. For a more detailed analysis of the implemented forms, a SWOT analysis was conducted, the results of which are summarised in Table 2.

**Table 2.** SWOT-analysis of forms of work with children with special needs during students' practice

Form of work	Advantages	Disadvantages	Possibilities	Threats
Individual lessons	Personalised approach to each child	High demands on training and time	Opportunity for deeper development of children's communication and social skills	This may cause an excessive workload for teachers and students
	Ability to focus on individual needs and problems of children	Students may experience difficulties in developing and implementing individual plans	Development of individual abilities of students	Possibility of lack of material and technical base for the implementation of personalised methods
Group classes	Supporting interaction and integration of children with special needs into the general group	Could be difficult to adapt the material to the level of all students	Creating conditions for the socialisation of children with disabilities	Possible conflicts and negative reactions from other students if the group is not properly integrated
	Promotes the development of social skills and teamwork	Could be difficult to manage a group if different learners have different needs and developmental levels	Opportunity to form friendly relationships between students with different abilities	Overloading students in case of difficult group situations

Table 2. Continued

Form of work	Advantages	Disadvantages	Possibilities	Threats
Multimedia technologies	Using modern technologies for interactive learning	Requires additional time to adapt materials and technologies for specific children	Stimulating children's interest through the latest technology and adapted games	Technical problems or unavailability of technological equipment in some schools
	Increases the level of student engagement in the learning process	Could be difficult to provide all students with the resources they need	Using a variety of multimedia resources to enhance learning	The need to constantly update technology and software to support inclusive learning
Pedagogical observations	Can be used to evaluate the effectiveness of the learning process in real-time	Requires considerable time for careful observation and analysis	Improving the learning process based on student observations	Can cause overloading of students or teachers in case of large numbers of children or groups
	Helps students learn to analyse student behaviour and development	The results of observations may be subjective, which affects the objectivity of the assessment	Students have the opportunity to improve their teaching skills and develop the ability to work with children with different needs	There may be insufficient feedback due to limited time or a large number of observations

*Source: compiled by the author*

According to the results of the SWOT analysis, individual lessons and group lessons are the most effective. Individual lessons demonstrate the best results in developing children's communication and social skills, as each student receives a personalised approach that allows them to focus on their individual needs. These classes require substantial preparation and time, which can lead to an excessive workload for teachers and students, especially with many children. The advantages of this approach outweigh the disadvantages, and they can be extremely useful in achieving deeper development in children with special needs. Group classes, although challenging, in adapting the material to different levels of development, are very effective in integrating children with special needs into the mainstream education process. They create conditions for socialisation and the development of teamwork skills, which is an important aspect for children with disabilities. The main challenge is possible conflicts between students and difficulties in managing the group if students have different levels of training.

Multimedia technologies appear to be less effective, despite their high potential to stimulate children's interest and increase engagement in learning. The use of multimedia resources requires additional time to adapt materials and technologies to the specific needs of children and may be limited by technical problems such as lack of necessary equipment or inaccessibility of software. Pedagogical observations, while providing an opportunity to assess the effectiveness of the learning process and improve students' teaching skills, have limitations. They require considerable time for careful observation and analysis and can be subjective, which affects the objectivity of the assessment. With many children or groups, observations can be overwhelming for students or teachers. Therefore, one-to-one and group sessions are most effective as they are best suited to the development of social skills and integration of children with special needs. For maximum

effectiveness, the potential difficulties associated with organising and managing these forms of work need to be addressed. Multimedia technology and pedagogical observation, while having potential, require more careful organisation and additional resources to be effective.

The use of individual and group classes significantly contributes to the training of future specialists in the field of inclusive education, forming their key pedagogical competencies. Individual classes allow students to learn how to adapt educational methods to the specific needs of children, which requires a deep understanding of the individual characteristics of students. This develops the ability to analyse behaviour, develop effective teaching strategies and use creative approaches to achieve educational goals. Such classes also contribute to the development of future teachers' emotional intelligence, as working with children with special educational needs requires high empathy and self-control. Group classes help future professionals master the skills of managing the learning process in a team, resolving conflicts and ensuring equal opportunities for all group members. Students learn how to adapt learning materials to multi-level groups, create an inclusive environment and effectively manage group dynamics. Students master practical skills for integrating children with special needs into the general educational environment. As a result of this experience, future teachers are prepared for the challenges of inclusive education and have a deeper understanding of the practical aspects of their future profession.

Based on the results of the analysis of students' practical activities in schools in the territory of the Fier Regional Administrative District, several recommendations for educational institutions were developed. They are aimed to improve the educational process, enhance the quality of practical training of future professionals and provide more effective support for children with special needs. One of the key recommendations is to expand the use of interactive technologies in the

training of future professionals. The results of the practice demonstrated that multimedia technologies help to engage children in the learning process, increase their interest and improve their understanding of the educational material. In this context, it is advisable to integrate more courses into educational programmes that focus on working with interactive platforms, adapted games and other multimedia resources. It is important to ensure that students have access to modern technological equipment during their internships. Educational institutions should develop special training for teachers and students to increase their competence in working with interactive tools. This will allow for more effective use of technology in working with children, based on their individual needs. Practical training is an integral part of developing the professional competence of future specialists. Experience has shown that students make the greatest progress in knowledge and skills when working directly with children with special needs. It is recommended to increase the number of hours allocated to internships and include them in the curriculum at an early stage. Educational institutions should enter into more cooperation agreements with specialised schools and rehabilitation centres. This would allow students to interact with different groups of children, study their needs and practice using different techniques. It is also necessary to provide systematic support for internships from experienced teachers who will help students analyse their work and improve their professional skills.

Effective education of children with special needs requires the involvement of specialists from different fields, including teachers, psychologists, speech therapists, social workers and doctors. It is recommended to develop an interdisciplinary approach in the process of training students, teaching them to work as part of such teams. Educational institutions can organise joint training, seminars and workshops with the participation of specialists from different disciplines. This will help students to develop teamwork skills, share experiences and better understand the relationship between the pedagogical, medical and social aspects of supporting children. Since teaching children with special needs requires a high level of training, it is recommended that individualised training programmes be implemented for students. These programmes may include additional courses aimed at in-depth study of specific aspects of the work, such as inclusive education methods, communication techniques with children with developmental disabilities, or adaptation of educational materials. It is also important to conduct regular monitoring of students' professional development, which will include an assessment of their theoretical knowledge, practical skills and motivation. This will help to identify weaknesses in training and adjust the learning process in time. The survey results showed that the level of student motivation increased significantly after the

internship. To maintain this interest, educational institutions should offer a variety of incentives, such as teaching competitions, presentations of successful practices, or the possibility of further study through international exchange programmes. One of the main threats identified during the practice is the insufficient material and technical base, which makes it difficult to use modern methods and technologies.

## ■ Discussion

Professional training of future professionals to teach children with special needs is one of the key aspects of inclusive education. This study identified several important trends and aspects that determine the effectiveness of such training. This section discusses the significance of the findings, their relationship to existing research, and the prospects for further research. The results of the study indicate the importance of a multidisciplinary approach in the training of future professionals. In particular, the integration of psychological, pedagogical and social components into the curriculum is critical to ensuring their ability to work effectively with children with special needs. This is confirmed by B. Zenelaga *et al.* (2024) and S. Romadhon *et al.* (2024), highlighting the need to create support systems for students with special needs at universities, which also requires proper training of teaching staff. The study emphasises the importance of the practical component in professional training. Practical classes aimed at developing empathy, understanding of individual characteristics of students, as well as the ability to communicate with parents of children with special needs, contribute to the formation of a stable professional position of future teachers. A study by A. Paloniemi *et al.* (2021) confirmed that the development of positive attitudes, supported by real-life experience, is a crucial factor in increasing teachers' confidence in implementing inclusive practices. Practical training also allows students to experience the real-life challenges of an inclusive environment and develop skills to overcome them effectively.

The study findings confirmed the conclusions of international scholars who emphasise the importance of developing specific competencies in future teachers for successful work with children with special needs. S. Hassani *et al.* (2020) emphasised that the effectiveness of school interventions aimed at the integration and active participation of students with special needs directly depends on the level of professional training of teachers. Highly qualified professionals should be proficient in modern methods of inclusive education, including adaptive technologies and the ability to consider the individual needs of students, as well as provide emotional support, which is critical for the development of children with special educational needs. N. Cooc (2019) and Z. Hyseni Duraku *et al.* (2021) highlighted the practical obstacles faced by educators in the implementation of inclusive education. One of the main

problems is the lack of proper professional training for teachers, which often leads to uncertainty in working with students with special needs. This is especially true for teachers who do not have sufficient experience or knowledge of inclusive education. A lack of material and technical resources, such as specialised teaching materials or adaptive devices, is often observed, which are necessary for effective work with such children. Another important aspect is the lack of adequate support at the level of schools and the education system, which makes it difficult to create an inclusive environment. The study confirms that these challenges can be overcome through systematic professional training of future professionals. This should include not only basic training during education but also regular in-service training for teachers throughout their professional careers. Such in-service training should include the development of specialised training and the introduction of a mentoring system that allows young teachers to gain practical knowledge and support from experienced colleagues. An important component is the development and implementation of programmes to adapt curricula and resources for children with special needs, which will ensure more effective integration of such students into the general educational process.

Despite a significant overlap with previous studies, some aspects of the research show discrepancies with international findings, which reveals new perspectives for further analysis. The study highlighted the pedagogical competencies of future professionals and their ability to create an inclusive educational environment. The study considered teacher training as a key basis for ensuring a quality educational process, including the introduction of adapted teaching methods, psychological support and an individual approach to students. This approach is relevant for ensuring equal access to education for all children, including those with special needs. However, it also points to a certain limitation of the study's focus, as it did not cover aspects of children's personal development, including life skills, which are an important component of educational programmes. Such a discrepancy between the focus of research and works such as N. Kotilainen & M. Takala (2024) opened new perspectives for further research that would allow for a deeper exploration of the role of teacher training in the development of life skills in children with special needs. Addressing this aspect will be an important step in ensuring a comprehensive approach to inclusive education, which aims not only at learning but also at the full socialisation and self-realisation of children, which in turn will contribute to their successful integration into society.

The specifics of professional training for future professionals involved in teaching children with special needs is a significant topic that requires special attention in the context of inclusive education. Such training should be holistic and integrated and account for

a wide range of aspects, including psychological, pedagogical, social, cultural and technological factors. One of the important areas is to study the impact of cultural and social factors on the effectiveness of professional training. As noted by J. Kauffman *et al.* (2022), the future of inclusive education depends on the adaptation of teaching methods to the specific contexts of different countries and cultures. This calls for more intercultural research to better determine how different social and cultural contexts can affect the development and learning of children with special needs. Cultural competence is becoming an important aspect for educators, as it can be used to teach children from different ethnic, linguistic and social groups, ensuring access to quality education. An important aspect is the introduction of digital technologies in the educational process of teacher training. M. Oliynyk (2022) emphasised the importance of using innovative technologies to improve professional training, allowing future professionals to master modern methods of working with children with special needs. Digital tools and platforms open new opportunities for creating individual learning paths, distance learning, and interactive methods that facilitate interaction with children with different needs. Intercultural cooperation is also an integral part of professional training, which can be used to employ the experience of other countries. E. Grigorenko *et al.* (2020) showed that international exchange of experience plays an important role in developing effective strategies to support children with special needs. International cooperation programmes open opportunities to learn from successful practices and adapt them to national education systems. The professional training of future professionals in education for children with special needs should be multifaceted and innovation oriented. It should include a deep understanding of social, cultural and technological aspects, as well as support for intercultural exchange of experience. Such an integrated approach will help to prepare professionals who can effectively contribute to diverse cultural and social environments and use modern technologies to develop inclusive education.

## ■ Conclusions

The study determined that a variety of forms of training should be provided during student internships to help develop key professional skills and competencies necessary for working in inclusive education. The practice enables future specialists to explore different methods of interaction with children, including group and individual activities, the use of innovative pedagogical technologies, as well as the development of communication and organisational skills. In addition, the internship develops the ability to adapt teaching materials to the needs of children with special educational needs, which is an important aspect of inclusive pedagogy.

It is important to emphasise that these forms of teaching have a direct impact on students' professional

development. For instance, planning lessons that take into account the different levels of children's needs develop students' skills in differentiation and individualisation of learning. When interacting with children, students gain practical experience in building positive relationships, developing empathy and the ability to resolve conflict situations. Considerable attention should be devoted to reflective methods of practice that allow students to analyse personal actions, identify strengths and weaknesses, and adjust their professional activities. This approach provides not only a deeper understanding of working with children but also the formation of a holistic professional identity for the future specialist. The study developed recommendations for Albanian educational institutions aimed at improving the training of students in the field of working with children with special needs. It is recommended to introduce interactive teaching methods, expand the practical training of students in specialised schools, and create interdisciplinary teams to support children with special needs. This will allow for more effective development of the professional competencies of future teachers and ensure better integration of children into educational activities. At the same time, the study revealed certain limitations. One of the main limitations was that the assessment of the effectiveness of the practice was based on students' self-assessments, which can be subjective. The teachers' assessments were more objective, but

they could also be limited by certain external factors, such as the amount of teaching time or the number of students. Limitations in the use of multimedia technologies and the material and technical base of educational institutions may affect the effectiveness of teaching.

Further research should address the impact of different teaching methods on the long-term developmental outcomes of children with special needs, as well as the introduction of new technologies in inclusive education. It is also important to conduct research aimed at assessing the impact of interdisciplinary teams on the quality of the educational process and support for children with special needs, as well as improving cooperation between teachers and other professionals. The results of the study emphasised the importance of developing effective methods of working with children with special needs that meet the requirements of inclusive education and confirm the need for continuous improvement of the pedagogical training of future professionals. The recommendations developed in this study can become the basis for further changes in educational institutions working with children with special needs.

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### ■ Conflict of Interest

None.

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## Особливості професійної підготовки майбутніх фахівців з освіти дітей з особливими потребами

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■ **Анотація.** Метою дослідження було визначення специфіки професійної підготовки майбутніх фахівців до роботи з дітьми з особливими потребами. Методологія дослідження включала практику студентів, анкетування, педагогічне спостереження та SWOT-аналіз форм роботи з дітьми з особливими потребами. У результаті дослідження отримано дані щодо ефективності різних форм роботи з дітьми з особливими потребами у практичній підготовці студентів педагогічних спеціальностей. Проведено систематичне порівняння самооцінки студентами професійних знань та вмінь з оцінками викладачів-менторів, що дозволило виявити як об'єктивний прогрес, так і суб'єктивні розбіжності в оцінках. Отримані дані свідчать про значне покращення рівня теоретичних знань, практичних навичок, комунікативних компетенцій та мотивації студентів. SWOT-аналіз форм роботи з дітьми з особливими потребами (індивідуальні та групові заняття, використання мультимедійних технологій та педагогічні спостереження) дав чітке уявлення про їх сильні та слабкі сторони, можливості для вдосконалення та потенційні загрози. Педагогічні спостереження виявилися ефективними в аналізі поведінки студентів, але можуть бути суб'єктивними. Результати підтверджують, що практична підготовка студентів значно підвищує їхню готовність до професійної діяльності. У ході дослідження визначено, що впровадження інтерактивних форм навчання, посилення міждисциплінарного підходу та покращення матеріально-технічної бази сприятиме підвищенню ефективності освіти для дітей з особливими потребами. Результати дослідження можуть бути використані закладами вищої освіти для вдосконалення підготовки майбутніх педагогів, які працюватимуть з дітьми з особливими потребами, а також освітніми установами для впровадження ефективних форм навчання та підтримки таких дітей

■ **Ключові слова:** освітні системи; мультидисциплінарні команди; міжособистісна взаємодія; інноваційні методи; інклюзивний підхід



## Development of vocational education in the context of globalisation and integration processes

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■ **Abstract.** The study aimed to explore the potential for adapting the best European practices in vocational education development for Ukraine amidst globalisation and integration processes. The research methodology encompassed the collection and analysis of legislative acts, statistical data, scholarly publications, and other information sources, alongside their comparison using quantitative and qualitative indicators. The key findings identified significant differences and shared characteristics between the vocational education systems of Ukraine and selected European Union countries – Germany, Finland, and Poland. Comparative analysis revealed that the German dual education system, Finland's innovative approach, and Poland's experience in educational reform represent promising models for study and partial adaptation within Ukraine's education system. The analysis was conducted to assess the effectiveness of various vocational education models and to determine their adaptability to the Ukrainian context. The results demonstrated considerable potential for incorporating European practices into Ukraine's vocational education system. It was established that integrating models from Germany, Finland, and Poland could enhance education effectiveness, particularly through the introduction of the dual system, the individualisation of learning, and legislative reform. The successful implementation of these changes requires consideration of cultural and economic differences, as well as active collaboration between educational institutions, the state, and businesses. Exploring the mechanisms for introducing European practices and their impact on Ukrainian education will facilitate more precise and effective reform implementation. The study's findings suggested that Ukraine can significantly enhance its vocational education system by adopting certain elements from the experiences of European countries. The introduction of the dual system could improve graduates' integration into the labour market, while Finnish approaches to individualised learning could raise education quality. Poland's experience with reforms could also prove beneficial for adapting Ukraine's legislative framework and education financing. Thus, the research provided specific recommendations for modernising vocational education in Ukraine, guided by the best European practices

■ **Keywords:** integration of educational processes; educational trends; foreign experience; education reform; vocational education; digitalisation of education; research integrity; dual education; individualisation of learning

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## ■ Introduction

The study of vocational education development is significant for several reasons. Vocational education plays a pivotal role in developing a skilled workforce, which is fundamental to economic growth and innovation. In rapidly evolving technological world, there is a constant need to update knowledge and skills to meet the demands of the labour market. Globalisation and integration processes create new challenges and opportunities that require educational systems to adapt to international standards. The development of vocational education is particularly significant in a context where national economies are becoming increasingly interconnected. It enhances the global competitiveness of the workforce and supports socio-economic stability. Moreover, modern vocational education helps reduce youth unemployment by facilitating their swift integration into the labour market. Examining this topic aids in designing effective education policies and programmes that address the needs of contemporary society and the economy. The importance of studying vocational education development is heightened by the rapid changes in the labour market driven by globalisation and technological advancement. Vocational education plays a crucial role in preparing a workforce capable of meeting the challenges faced by various economies. Businesses require employees with not only fundamental professional knowledge but also new competencies such as digital literacy, flexibility, and the ability to adapt quickly. This necessitates continuous improvement and innovation in educational systems, including curricula, teaching methods, and collaboration with employers.

The development of vocational education also holds significant social importance as it provides young people with the opportunity to acquire a qualification and find their place in society. This reduces unemployment rates, promotes social integration, and fosters stability. In rapidly changing world, where knowledge and skills quickly become obsolete, vocational education ensures lifelong learning, which is crucial for maintaining competitiveness in the labour market. Given these factors, the importance of researching vocational education development cannot be overstated. It underpins economic growth, innovation, and social stability. Consequently, this topic is now being actively explored by researchers worldwide, including P. Stoodley & G. Mason (2024) who determined that vocational education, within the context of globalisation, significantly influences workforce development, economic growth, and social mobility. One of the leading researchers in this field is S. Liu (2022), who analysed the impact of globalisation on vocational education in various countries. He noted that globalisation fosters interconnections between educational systems, leading to the standardisation of qualifications and requirements, as well as an increased role for international

organisations such as United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Organisation for Economic Co-operation and Development (OECD) in developing educational policies. S. Vaskiv *et al.* (2023) emphasised that vocational education must adapt to the new challenges of globalisation by developing flexible curricula and implementing a competency-based approach.

Researchers such as M. Zhylin *et al.* (2024) have examined the specific development of vocational education in Ukraine within the context of globalisation processes. They emphasised the importance of integrating the Ukrainian vocational education system into the European educational space and implementing international educational standards. Researchers C. Regehr *et al.* (2024) focused on the need to develop academic mobility programs that contribute to increasing the level of education and professional training of students. Another significant contribution to this area of study was made by R. Raj *et al.* (2024). They investigated the role of vocational education in ensuring the success of national economies in a global context. They also highlighted that vocational education should play a key role in training a workforce capable of operating in a rapidly changing labour market. There is a need to introduce innovative technologies into the educational process and develop cooperation between educational institutions and businesses. The study by S.S.-Y. Ngai *et al.* (2021) focused on analysing the challenges faced by vocational education in a changing world. They highlighted that one of the primary challenges is ensuring access to quality education for all segments of the population, particularly in developing countries. The researchers examined the role of vocational education in developing human capital and promoting social integration, emphasising the importance of international cooperation in addressing these issues. H. Yang *et al.* (2024) and J.-H. Im & G.Y. Park (2024) analysed the changes occurring in vocational education systems. They noted that rapid digitalisation is driving the development of new forms of learning, such as online education and hybrid learning models, which have become increasingly popular due to the COVID-19 pandemic. They also emphasised the importance of preparing teachers to work in a globalised educational environment. The aim of this research was to assess the potential for implementing advanced European vocational education practices in Ukraine to enhance the effectiveness and competitiveness of the national education system.

## ■ Materials and Methods

The methodology of this research into the development of vocational education in Ukraine and European Union (EU) countries within the context of globalisation and integration processes was based on the application of comparative analysis as the primary method. This

approach allowed for a detailed examination of vocational education systems in different countries, identifying key trends, differences, and opportunities for improving Ukraine's national education system. Germany, Finland, and Poland were selected for comparative analysis. These countries have distinct vocational education models, enabling a comprehensive study. Germany is renowned for its dual education system, which successfully integrates theoretical learning with practical on-the-job training. Finland is distinguished by its innovative approach to education, focusing on individual student needs. Poland, as a neighbouring country that has undergone reforms and EU integration, serves as an interesting case for comparison with Ukraine in terms of adapting to European standards. The choice of these countries allowed for the exploration of various approaches and the identification of best practices for adaptation in Ukraine.

In the initial phase of the research, key criteria for comparison were identified. These include: legal regulation of vocational education, funding models, curriculum content, the quality of infrastructure and resources, teacher training, and the interaction between educational institutions and the labour market. The selection of these specific criteria is due to their significant impact on the effectiveness and quality of vocational education in the context of contemporary globalisation challenges. Data was collected from various sources. This included academic articles, statistical data from international organisations such as the UNESCO World Heritage Convention (n.d.), and Ukrainian legislation (Law of Ukraine No. 103/98-BP, 1998; Law of Ukraine No. 2145-VIII, 2017). Data collection aimed to gather as comprehensive information as possible on the various aspects of vocational education in the countries under study. The next stage involved conducting a comparative analysis. Based on the collected data, quantitative and qualitative assessments were made for each of the defined criteria. This allowed for the identification of key differences and similarities between Ukraine and EU countries, as well as an assessment of how globalisation and integration processes impact the development of vocational education. The final stage of the research involved interpreting the obtained results. Through this analysis, key factors contributing to the successful development of vocational education in EU countries were identified, and the possibilities of adapting them to the Ukrainian education system were evaluated. Additionally, the main challenges faced by Ukraine in modernising its vocational education system were identified, and recommendations were proposed for addressing these challenges based on the experience of EU countries. This approach allows not only for an assessment of the state of vocational education in Ukraine but also for the formulation of strategies for its further development, taking into account international experience and integration processes.

## ■ Results

Vocational education is a cornerstone in preparing a skilled workforce for any nation's economy. Globalisation, characterised by increasing interdependence between countries and peoples, significantly influences all aspects of society, including vocational education. In the context of globalisation, vocational education takes on new characteristics and functions, facilitating adaptation to changes in the global labour market and preparing a workforce capable of operating in rapidly changing environments. One of the primary features of vocational education in a globalised world is its focus on developing globally relevant competencies. This includes knowledge of international standards, proficiency in foreign languages, the ability to work in multicultural teams, and a readiness for continuous professional development. Globalisation also increases the demand for flexible and adaptable curricula that can quickly respond to changes in technology, economics, and societal needs. Another important characteristic is the growing role of information and communication technologies (ICT) in vocational education. ICT enables distance learning, which has become particularly relevant in the context of the pandemic when traditional forms of education often become inaccessible. Moreover, ICT allows students to access the latest knowledge and skills that meet the demands of the globalised labour market.

In the contemporary world, vocational education fulfils several key functions that define its significance in the context of globalisation. It contributes to the development of competitive professionals who can successfully function not only in the national but also in the international labour market. This is achieved through the implementation of international educational standards such as the ECTS credit system and preparation for international qualification exams. Vocational education in the context of globalisation serves the function of social integration and mobility. Through the development of academic mobility programs like Erasmus+ (n.d.), students and faculty have the opportunity to study and work abroad, fostering knowledge exchange, cultural enrichment, and increased educational attainment. Vocational education promotes innovation and technological progress. In many countries, vocational institutions actively collaborate with businesses and research institutions, enabling the integration of the latest scientific and technological advancements into the educational process and fostering the development of students' innovative potential.

Integration processes occurring worldwide, particularly within the EU, also influence the development of vocational education. One key aspect is the harmonisation of educational standards, enabling mutual recognition of diplomas and qualifications across different countries. This, in turn, promotes labour mobility, a crucial factor in a globalised world. Integration

processes stimulate the development of new forms of cooperation between educational institutions in different countries. Joint educational programs, dual degrees, and international internships are becoming integral parts of vocational education, fostering the development of professionals with a global outlook who are prepared to work in multicultural environments. However, integration processes also present new challenges for vocational education. These include the need to consider the cultural and economic specificities of different countries, as well as ensuring equal access to quality education for all segments of the population, regardless of their social or economic status.

In Ukraine, vocational education plays a particularly crucial role in modernising the national economy and integrating into the global market. Vocational education fosters the development of competencies such as technical skills, the ability to adapt quickly to changing labour market conditions, and the formation of a professional culture and ethics. This promotes social mobility, allowing young people from all walks of life to access vocational training and employment. The importance of vocational education in Ukraine is also driven by the need to enhance the competitiveness of Ukrainian enterprises on the international stage. Globalisation demands a high level of professional knowledge and skills from workers, aligned with contemporary technological standards. This poses a challenge to the vocational education system to produce graduates capable of working effectively in a constantly evolving labour market.

Vocational education in Ukraine is undergoing a process of reform and adaptation to new economic and social conditions. A primary objective is to align educational standards with international requirements, which is being achieved through the implementation of new educational programs, modernisation of the material and technical base of higher education institutions, and the upskilling of teaching staff. In 2017, the Law of Ukraine No. 2145-VIII (2017) was adopted, outlining the fundamental principles and directions for the development of education, including vocational education. A significant step forward was the creation of a national qualifications' framework, designed to facilitate the integration of Ukrainian vocational education into the European Higher Education Area. This enables the improvement of education quality and ensures that qualifications obtained in Ukraine align with international standards.

Despite significant efforts by those involved in the educational process, the state of vocational education in Ukraine remains complex. There are challenges related to insufficient funding, outdated infrastructure, and a lack of integration of modern technologies into the learning process. These issues are particularly acute in regions where the level of vocational edu-

cation development often lags behind metropolitan standards. Furthermore, there is a need for closer cooperation between educational institutions and employers, which would enable a better understanding of labour market demands and the adaptation of curricula to contemporary requirements. In this context, dual education, which combines theoretical learning with practical experience in enterprises, plays a crucial role. In Ukraine, this approach is only beginning to develop, but it is already demonstrating positive results, contributing to the improvement of professional training.

Vocational education in Ukraine, like many other countries, faces numerous challenges driven by globalisation. These challenges impact all aspects of education, from curriculum content to teaching methods and assessment. In a globalised world, vocational education must adapt to the evolving demands of the labour market, technological advancements, and societal and cultural changes. One of the most significant challenges for vocational education is the rapid pace of technological development. In the world, robotics, automation, artificial intelligence, and digitalisation are transforming many professions. These changes necessitate the constant updating of curricula to ensure students acquire relevant knowledge and skills. Traditional occupations are being transformed or phased out, so it is essential to equip students with the competencies to be competitive in the job market. Digitalisation is also reshaping teaching methods. Online courses, distance learning, and the use of virtual reality and other technologies are becoming integral parts of the educational process. A key challenge is ensuring access to modern technologies for all participants in the educational process, especially in remote regions.

Globalisation has led to a shift in the demands for professional qualifications. The job market is becoming increasingly dynamic, requiring employees to be highly adaptable, able to work in interdisciplinary teams, and possess strong foreign language skills and cultural competence. These demands challenge vocational education to produce graduates capable of rapidly adapting to change, engaging in lifelong learning, and applying their knowledge in diverse contexts. This process also promotes the internationalisation of education, requiring educational institutions to align with international standards and practices. This necessitates the implementation of new accreditation approaches, the development of international cooperation, and the exchange of experiences among faculty and students. However, in the face of insufficient funding and limited resources, this presents a significant challenge for many educational institutions.

Funding for education in Ukraine remains a critical issue, particularly in the context of vocational education. Insufficient financial resources for education lead to a decline in the quality of education, a lack of

modern equipment, low teacher salaries, and limited opportunities for professional development. In a globalised world, where competition in the labour market is increasing and demands for the quality of education are rising, financial constraints pose a significant barrier to the development of vocational education. Vocational education must also account for the diversity of students, their cultural backgrounds, needs, and interests. Fostering tolerance, the ability to work in multicultural environments, and respect for diversity among students is essential. Globalisation necessitates the reform of the vocational education system in Ukraine to enhance its flexibility, relevance, and responsiveness to contemporary challenges. This includes developing new curricula, updating teaching methodologies, and implementing dual education, which combines theoretical learning with practical training in enterprises. However, the reform process requires time, resources, and effort, which also presents a significant challenge. One of the negative consequences of globalisation is the brain drain of skilled professionals. Graduates of vocational institutions often emigrate to other countries in search of better job opportunities and higher salaries. This leads to a shortage of qualified workers in certain sectors within the country and a decline in the development of the national economy. On the one hand, students have the opportunity to study abroad, gain international experience, and acquire new knowledge. On the other hand, this presents a challenge for Ukrainian educational institutions to create conditions that are attractive to foreign students and to retain talented students within Ukraine. Given the state of vocational education, Ukraine has significant potential for further development. Promising directions include the implementation of modern educational technologies, the development of dual education, and the intensification of international cooperation in the field of vocational training. It is also important to continue working on the integration of the Ukrainian vocational education system into the European Education Area,

which will ensure the recognition of Ukrainian qualifications internationally and contribute to improving the quality of specialist training.

Considering the experiences of Germany, Poland, and Finland when reforming the Ukrainian vocational education system is of paramount importance. Each of these countries has unique experiences that can be adapted to the Ukrainian context to improve the quality of specialist training and ensure that graduates meet the demands of the modern labour market. In particular, Germany is a leader in implementing a dual education system, which combines theoretical learning in educational institutions with practical experience in the workplace. This system allows students to acquire practical skills during their studies, significantly increasing their readiness for employment upon graduation. Thanks to this approach, the youth unemployment rate in Germany is one of the lowest in Europe. In turn, Poland has successfully adapted its vocational education system to the requirements of the European Union, which has allowed for a significant improvement in the quality of specialist training. Poland's journey from a post-Soviet system to European standards makes its experience particularly valuable for Ukraine, which is also on a path towards European integration. Polish reforms encompass aspects such as the modernisation of educational programs, the implementation of an independent quality assurance system for education, and the development of cooperation with employers. Finland, on the other hand, is renowned for its innovative approach to education, including vocational training. A key aspect of the Finnish system is its emphasis on individualised learning pathways, where education is tailored to the needs and abilities of each student. Additionally, Finland actively utilises modern technologies and innovative teaching methods, making its education system one of the most effective in the world. A more detailed analysis of the features of the aforementioned countries, with the aim of comparing them to Ukrainian vocational education, is presented in Table 1.

**Table 1.** Comparative analysis of vocational education in Ukraine, Germany, Finland and Poland

Analysis indicators	Countries			
	Ukraine	German	Finland	Poland
<b>Education management system</b>				
Central management	The Ministry of Education and Science of Ukraine manages the entire education system	The Federal Ministry of Education and Research manages general policy, but responsibility for vocational education lies at the level of the Länder (federal states)	The Ministry of Education and Culture of Finland is responsible for education at the national level	The Ministry of Science and Higher Education is responsible for national education policy, including vocational education
Role of regional and local authorities	Regional education departments control and coordinate at the regional level. Local authorities have a limited role	The significant role of the Länder, which have their own laws and management system for vocational education	Regional and local authorities play an important role in implementing education policy, financing, and managing educational institutions	Local authorities are responsible for managing and financing vocational education institutions

Table 1. Continued

Analysis indicators	Countries			
	Ukraine	German	Finland	Poland
<b>Funding</b>				
Funding sources	Primary funding from the state budget, partially from private investments and international grants	State budget, Länder budgets, private sector (companies supporting vocational education)	State budget, local budgets, private investments, EU grants	State budget, local budgets, EU grants, private sector
Share of GDP Spent on Vocational Education	Approximately 1-2% of GDP is spent on vocational education	Approximately 2-3% of GDP is spent on vocational education	High funding level, around 4-5%	Approximately 3-4% of GDP is spent on vocational education
Funding for Students and Educational Institutions	Students are mainly funded by the state. Educational institutions are funded by the state budget and private investments	Companies are actively involved in financing students through the dual education system. Educational institutions are funded by the state and regional budgets	Students receive financial support from the state and local authorities. Educational institutions are funded by the state and private sector	Students and institutions receive funding from the state budget and through international grants (EU)
<b>Dual education system</b>				
Presence of a dual education system	No, developing within pilot projects and business collaboration programs	Yes, widely implemented	No, but elements of dual education exist in some programs	No, but dual elements appear in some programs
The ratio of theoretical to practical training	Approximately 70% theory, 30% practice	About 50% theory, 50% practice (depending on the program)	High focus on theory (70%), with practical elements (30%)	Theory approximately 60-70%, practice 30-40%
Percentage of students enrolled in this system	A small percentage (up to 5%) in pilot projects	About 50% of students	A small percentage (less than 10%)	A small percentage (up to 10%)
<b>Curriculum content</b>				
Program flexibility	Partially flexible, but depends on the reform of the system	Highly flexible, easily adaptable to market demands	High flexibility, especially in response to labour market needs	Moderate flexibility, adaptation to market demands take time
Compliance with international standards	Partially complies with international standards, further harmonisation needed	High compliance with international standards	Complies with international standards in most programmes	Increasing compliance with international standards due to reforms
Innovative teaching methods	Used but limited (ICT, project-based learning implemented gradually)	Extensive use of ICT, project-based learning, simulations	High level of innovation, including ICT and project-based learning	Gradual implementation of ICT and project-based learning
<b>Interaction with the labour market</b>				
Collaboration with employers	Limited collaboration, but growing interest from business. Employers are increasingly involved in programme development.	Widespread collaboration, employers are actively involved in programme development and assessing their effectiveness	Close collaboration with employers, especially in high-tech industries.	Moderate collaboration, but increasing due to reforms and European programmes
Internship and practical training system	Present but underdeveloped; internships are often limited or short-term	Highly developed system, almost every student undergoes a long internship in a company	Well-developed internship system, but not in all sectors	Moderately developed internship system, but there is increasing support from the state and business
Employment rate	Varies by industry, on average 60-70%	Very high (over 90%) due to close cooperation with employers and the dual education system	High, around 80-85%, especially in technical fields	Moderate (70-80%), but increasing due to active interaction with the labour market
<b>International Integration</b>				
Participation in international education programmes	Limited participation, but there is an increase within EU programmes (Erasmus+ and others)	Active participation in international programmes, such as Erasmus+, and other European initiatives	High level of participation in international programmes (Erasmus+, Nordic cooperation)	Moderate participation, growing due to EU programmes and active cooperation with European countries
Recognition of diplomas abroad	Partial recognition, depending on the specific country and speciality	Wide recognition of diplomas in the EU and other countries due to high education standards	High recognition of diplomas in EU countries and internationally	Recognition at the EU level, but there may be limitations in some countries outside the EU

**Source:** compiled by the authors based on research by O. Pasko et al. (2023), S. Johnston et al. (2024), M. Ryder & F. Browne (2024)

The analysed data clearly highlights the key differences and similarities between the vocational education systems of the countries under study, which is crucial for interpreting the results and formulating recommendations. Adapting effective approaches from Germany, Finland, and Poland can enhance the quality of vocational education in Ukraine, making it more responsive to labour market demands and increasing the competitiveness of Ukrainian graduates both nationally and internationally. For instance, the German dual education system, which combines theoretical learning in educational institutions with extended practical experience in companies, is worth considering. To adapt this, pilot projects in collaboration with large companies could be established to test this approach in various sectors. It is important to establish agreements between educational institutions and employers to provide students with stable placements for practical training. Ukrainian vocational education needs closer collaboration with employers, as seen in Germany and Finland. Involving employers in developing curricula to align with actual labour market needs is essential. Regular consultations with business representatives should be organised, and they should be involved in developing educational standards and programs. Regional councils could be established, comprising representatives from businesses, educational institutions, and government.

The flexibility of study programs, as seen in Finland, could be adopted by Ukraine, as the continuous adaptation of curricula to new labour market demands contributes to enhancing the competencies of learners. Mechanisms need to be developed for regular updates of these programs, particularly based on labour market research. This could involve introducing modular learning and allowing students to choose specialisations within programs. In Poland and Germany, the internship and practical training systems are successful and well-developed, serving as a mandatory component of studies and providing students with real-world experience. Therefore, for Ukrainian vocational education, mandatory internships in the later years of study should be introduced, with their outcomes assessed as part of final exams. To facilitate this, cooperation with employers must be established to provide students with suitable placements for practical training.

A more thoughtful approach to teacher training, similar to the German model, should be adopted. Germany has a high percentage of lecturers with practical experience in their respective fields. Programs should be developed to attract specialists to teach in vocational higher education institutions. This could include short-term professional development courses for such lecturers, enabling them to effectively transfer their practical knowledge to students. Following the examples of Poland and Finland, international integration should be enhanced. Active participation in international educational programs and initiatives raises the

level of education and ensures international recognition of diplomas. To achieve this, Ukrainian educational institutions should increase their participation in programs like Erasmus+ (n.d.), facilitating student and faculty exchanges. Aligning curricula with international standards will facilitate easier recognition of Ukrainian diplomas abroad.

Ukraine is facing the challenge of modernising its vocational education system to meet the demands of labour market. Based on the information presented above regarding the experiences of Germany, Poland, and Finland, recommendations have been developed for implementing these practices in Ukraine's vocational education system to enhance its alignment with contemporary labour market needs. Considering European standards in this field, a comprehensive set of recommendations should be implemented to improve the effectiveness of specialist training, their competitiveness, and their mobility in the global labour market. A key element of integrating European practices is the harmonisation of Ukraine's educational programs and qualification standards with European ones. This involves aligning national standards with the European Qualifications Framework (EQF), ensuring transparency and recognition of Ukrainian diplomas in EU countries. To achieve this, an analysis of existing programs and their alignment with contemporary labour market demands is necessary, along with involving European experts in developing new educational programs. Dual education, which combines theoretical learning in educational institutions with practical training in enterprises, is one of the most successful European models for workforce development. Implementing this model in Ukraine would facilitate better adaptation of graduates to real-world work environments, reduce youth unemployment, and increase their professional mobility. To achieve this, a legislative framework is needed to encourage the active participation of employers in the educational process and provide incentives for businesses offering student placements.

The contemporary job market demands that professionals possess cutting-edge technological skills. Therefore, it is essential to integrate digital and innovative technologies into vocational education. This could involve creating learning platforms with access to European resources, developing distance learning, and utilising virtual reality to simulate production processes. It is necessary to provide teacher training to equip educators with the skills needed to work with modern technologies and develop their digital competencies. To enhance the quality of vocational education in Ukraine, it is crucial to expand international cooperation with European educational institutions. This could include student and faculty exchanges, joint research projects, and participation in European educational programs. Such cooperation would facilitate the exchange of expertise, the implementation of European quality

standards in the Ukrainian education system, and increase the mobility of students and faculty.

Soft skills, such as communication, critical thinking, creativity, and teamwork, are becoming increasingly important in the modern job market. European practices demonstrate that integrating the development of these skills into educational programs enhances graduates' competitiveness. Ukraine needs to develop methodologies and introduce courses aimed at fostering soft skills in vocational education students. Another crucial European practice is the creation of a system for independent quality assurance in education, allowing for an objective assessment of students' preparedness and the alignment of study programs with labour market demands. Ukraine should establish a similar system, including external examinations, accreditation of educational institutions by independent agencies, and ongoing quality monitoring by employers. Funding for vocational education is a key factor in its successful development. It is essential to ensure stable and adequate funding for the renewal of educational institutions' infrastructure, teacher training, and the implementation of new technologies.

## ■ Discussion

The research findings have shown that in the contemporary world, globalisation and integration processes influence all spheres of life, including education. In the context of ever-increasing international cooperation, technological progress, and economic interdependence, vocational education is undergoing significant changes. Globalisation demands that education systems comply with international standards while providing opportunities for the exchange of knowledge and experience between different countries.

One of the most noticeable impacts of globalisation on vocational education is its unification, as noted by many researchers. In particular, K. Yoon *et al.* (2023) highlighted that this process contributes to the standardisation of educational programs in various countries. This enables the creation of programs that meet the demands of the international labour market, making graduates competitive not only nationally but also globally. This aligns with the results of this study, which also indicate that educational programs in many countries are adapting to international standards, thereby enhancing the quality of education and specialist training. However, the unification of vocational education also has its drawbacks. R. Dobrovolska *et al.* (2023) emphasised that such unification can lead to a loss of national identity in education systems. They point out that adapting to international standards may require the exclusion of certain cultural and traditional elements from curricula. This is confirmed by the present study, which indicates that unification can diminish the uniqueness of national educational programs, potentially negatively impacting their ability to meet the specific needs of local labour markets.

The research findings have demonstrated that integration processes between different countries also significantly impact the development of vocational education. They facilitate the creation of international educational networks and programs, enabling students and faculty to participate in exchange programs and study abroad. This is supported by the research of M. Kanan *et al.* (2023) and M. Hnatyuk *et al.* (2024), who noted that international cooperation in education can enhance the quality of specialist training, as students have the opportunity to study advanced programs and gain access to the latest knowledge and technologies. In this context, the results of this study also highlighted the importance of integration processes for the development of vocational education. Cooperation between educational institutions from different countries promotes the exchange of experience and knowledge, which improves the quality of education. In particular, it was found that mutual activities between universities allow faculty to enhance their qualifications and students to obtain a higher quality education that meets the demands of the global labour market. The research has also identified certain challenges associated with integration. As noted by J. Li & X. Li (2024) and A. Mine-nok *et al.* (2024), integration processes can lead to the unification of educational programs, which may negatively impact their adaptability to local contexts. For example, programs developed in one country may not always be relevant in another due to differences in culture, economy, or level of technological development. This aligns with the findings of this study, which indicated that the integration of international standards should consider local specificities to avoid a decline in the quality of education.

The research findings highlighted the significance of technological advancements in shaping the development of vocational education within a globalised context. This is corroborated by studies conducted by A. Luthra *et al.* (2024), R.A. Elyashiv & K. Rozenberg (2024), and M. Estaji (2024). They found that integrating cutting-edge technologies into the learning process has become a necessity. The utilisation of digital technologies allows for more personalised and effective learning experiences, providing students with access to a wide range of resources and opportunities for self-directed study. This research further confirmed the importance of technological progress for the development of vocational education. It was discovered that the use of modern technologies, such as online platforms, virtual laboratories, and other digital tools, significantly enhances the quality of education. This enables not only the customisation of the learning process to meet the individual needs of students but also provides access to education for a broader range of individuals, including those living in remote regions or unable to attend classes in person. However, technological advancements also present new challenges for vocational education.

As noted by researchers such as P. Norris (2024) and M. Vičič Krabonja *et al.* (2024), the implementation of new technologies necessitates continuous updates to the knowledge and skills of educators, which can be a daunting task in resourceconstrained environments. This research also emphasised that educators often encounter difficulties when integrating new technologies into the learning process due to a lack of experience or inadequate technical support. This can lead to uneven technology adoption, reducing the overall effectiveness of learning.

Globalisation also has a significant impact on the cultural aspects of vocational education. The study by D. Moreira (2019) indicated that cultural differences can have a profound influence on the learning process, particularly on students' adaptation to new environments. This is especially relevant in the context of increasing international cooperation, where students from different countries face the need to adapt to new cultural settings. This aligns with the findings of this study, which revealed that cultural factors play a crucial role in the globalisation of vocational education. Specifically, it was noted that the integration of international standards should consider the cultural specificities of each country to ensure successful student adaptation and enhance the effectiveness of the learning process. This also corresponds with the results of the study by E. Abiltarova *et al.* (2022), who believe that globalisation can foster cultural exchange and mutual enrichment, allowing students to broaden their perspectives and be more open to new ideas and approaches.

It is important to note that not all researchers share a positive view of the cultural impact of globalisation. For instance, R. Burton *et al.* (2024) suggested that the cultural homogenisation that can arise from globalisation may lead to a loss of national identity and the uniqueness of educational systems. This is supported by this study, which highlighted the need to preserve cultural specificities during the process of adapting to global educational standards. Another challenge remains the need to ensure the accessibility of vocational education for all segments of the population. Globalisation often leads to a widening gap between rich and poor countries, which can negatively impact access to education. Research by M. Verkuyl *et al.* (2024) has shown that in many countries, particularly developing ones, access to quality education is limited due to economic, social, and infrastructural challenges. This issue was also addressed in this study, which noted that to ensure equitable access to education, strategies must be developed that address these challenges and propose ways to overcome them.

Despite the existing challenges, globalisation presents new opportunities for the development of vocational education. One such opportunity is the strengthening of international cooperation in education. As research has shown, collaboration between countries

allows for the exchange of best practices and the joint development of new educational programs and standards, contributing to the improvement of education quality on a global scale. This aligns with the work of researchers B. Hassan Beygi *et al.* (2023) and D. Tuohy *et al.* (2024), who emphasised the importance of international cooperation, particularly in the context of creating joint educational programs that allow students to obtain internationally recognised qualifications. Therefore, to successfully develop vocational education in a globalised world, it is necessary to strike a balance between unification and the preservation of national identity, considering the cultural and economic specificities of different countries, and actively integrating the latest technologies into the learning process. This will ensure high-quality education and the training of competitive professionals who are capable of working in a globalised world.

## ■ Conclusions

This research highlighted the potential for adapting best European practices to develop vocational education in Ukraine within the context of globalisation and integration processes. It was found that vocational education in Ukraine is a key factor in ensuring economic development and the country's competitiveness in the global market, but it faces numerous challenges in the era of globalisation. To overcome these challenges, comprehensive reforms are needed, aimed at improving the quality of education, developing international cooperation, adapting to new labour market demands, and technological changes. This requires efforts from the government, higher education institutions, employers, and other stakeholders. Only in this way can the competitiveness of Ukrainian professionals in the global labour market be ensured and the sustainable development of the national economy be promoted. Despite the existing problems, the vocational education system has the potential for successful development, provided that further reforms are implemented and there is active support from the state and international partners.

A comparative analysis of German, Finnish, and Polish education systems has revealed potential models and approaches that could be successfully implemented in the Ukrainian vocational education system. In particular, the introduction of a dual education system, typical of Germany, could increase graduate employment rates. Finland's innovative approaches to individualised learning have the potential to improve the quality of education, while Poland's experience in reforming its education system can help Ukraine adapt its legislation and education financing to modern requirements. It is also important to consider that the process of adapting European practices to the Ukrainian education system will require a balanced approach that includes a detailed analysis of local conditions and needs. Adaptation should not be merely a technical transfer of

practices but should also take into account sociocultural aspects such as pedagogical traditions, student and teacher motivation, and the specific characteristics of the Ukrainian labour market. Effective communication between all stakeholders, including educational institutions, government bodies, businesses, and civil society organisations, is essential. This will enable a smoother and faster implementation of changes and reduce the risk of unforeseen difficulties. Other important aspects include monitoring and evaluating the effectiveness of implemented practices, which will help to adjust strategies and approaches in a timely manner. It is important to note some limitations of this study. The research is limited by the number of countries selected for comparison, which may affect the completeness of the conclusions. Taking into account the cultural and economic differences between Ukraine

and EU countries is also an important factor that can complicate the direct adaptation of European practices. Future research could include a deeper exploration of the specific mechanisms for implementing European models in Ukrainian vocational education, as well as an analysis of the practical results of such implementations. This would provide additional insights into possible approaches and pathways for adapting European models and offer a more detailed understanding of the successes and challenges faced by other countries during such transformations.

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### ■ Conflict of Interest

None.

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## Розвиток професійної освіти в умовах глобалізації та інтеграційних процесів

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■ **Анотація.** Метою дослідження було визначити можливості адаптації найкращих європейських практик розвитку професійної освіти для України в умовах глобалізації та інтеграційних процесів. Методологія дослідження включала збір і аналіз законодавчих актів, статистичних даних, наукових публікацій та інших джерел інформації, а також їх порівняння за кількісними та якісними показниками. Основними результатами стало виявлення ключових відмінностей і спільних рис між системами професійної освіти України та обраних для порівняння країн Європейського Союзу: Німеччини, Фінляндії та Польщі. Порівняльний аналіз показав, що німецька дуальна система освіти, фінський інноваційний підхід та польський досвід реформування освіти є перспективними моделями для вивчення та часткової адаптації в українську систему освіти. Порівняльний аналіз був проведений для оцінки ефективності різних моделей професійної освіти та визначення можливостей їх адаптації в Україні. Результати дослідження засвідчили значний потенціал адаптації європейських практик до системи професійної освіти в Україні. Було визначено, що інтеграція моделей з Німеччини, Фінляндії та Польщі може покращити ефективність освіти, зокрема шляхом запровадження дуальної системи, індивідуалізації навчання та реформування законодавства. Успішна реалізація цих змін потребує врахування культурних і економічних відмінностей, а також активної співпраці між освітніми установами, державою та бізнесом. Вивчення механізмів впровадження європейських практик та їх впливу на українську освіту сприятиме більш точному і ефективному запровадженню реформ. Висновки дослідження вказали на те, що Україна може значно покращити свою систему професійної освіти, запозичивши деякі елементи з досвіду європейських країн. Впровадження дуальної системи може сприяти кращій інтеграції випускників на ринок праці, а фінські підходи до індивідуалізації навчання допоможуть підвищити якість освіти. Польський досвід реформ також може бути корисним для адаптації законодавчої бази та фінансування освіти в Україні. Результати дослідження надали конкретні рекомендації щодо модернізації професійної освіти в Україні, орієнтуючись на найкращі європейські практики

■ **Ключові слова:** інтеграційні освітні процеси; освітні тренди; зарубіжний досвід; реформування освіти; професійна освіта; цифровізація освіти; дослідницька доброчесність; дуальна освіта; індивідуалізація навчання



## **Peculiarities of pedagogical process in teaching technical disciplines with armoured vehicles and equipment to cadets of higher military educational institutions**

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■ **Abstract.** The study aimed to analyse the impact of simulation equipment on cadet training and methods that combine theoretical training, practical training on equipment and the use of simulators. For this purpose, an experiment was conducted, during which the cadets completed a combined training programme that included both theoretical classes and practical exercises on real equipment, as well as on modern simulators. The analysis of the results showed a significant improvement in theoretical knowledge of 26% compared to the baseline, which indicates an improved understanding of the complex technical aspects of armoured vehicles and equipment. Moreover, the study showed that the practical skills of the cadets improved by 16.3%, reflecting an increased ability to apply theoretical knowledge in real-world situations. One of the key results of the study was an increase in motivation to learn by 89% of the cadets in the experimental group, which demonstrates increased interest and readiness to actively participate in the learning process. At the same time, the effectiveness of the methodology was found to vary depending on the individual characteristics of the cadets, and there are certain difficulties in adapting simulation methods to real combat conditions. The study also emphasised the importance of further consideration of the long-term impact of simulation technologies on cadet training and the need to develop individualised training programmes that will optimise the learning process for each participant. The study contributes to improving the methods of training military specialists and will help make training more effective and efficient in the future

■ **Keywords:** simulation methods; integration of technologies; practical skills; interactive methods; educational technologies; professional training; didactic approaches

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## ■ Introduction

In the conditions of active military operations and a significant threat to state sovereignty, the training of cadets of higher military educational institutions (HMEI) is of particular importance. This applies not only to the development of their physical and moral qualities but also to the acquisition of in-depth knowledge in technical disciplines related to the operation of the latest armoured vehicles. Given that modern armed forces are dependent on technical sophistication, the quality of officer training has a direct impact on the effectiveness of combat missions.

The problem of teaching technical disciplines with the use of armoured vehicles is the need to develop a high level of competence in cadets to effectively manage modern military equipment. Such tasks cannot be solved only through traditional teaching methods, so modern researchers emphasise the need to integrate innovative approaches. A. Dorofiev (2024) addressed the international experience of officer training, in particular the use of simulation equipment to enhance practical skills. Y. Poltavets (2020) analysed the challenges faced by military cadets in mastering technical disciplines when using modern simulators. The technical training of cadets using armoured vehicles has its specifics due to the complexity of technical equipment and the need to use innovative methods. I.I. Zadorozhnyi *et al.* (2021) emphasised the importance of combining theory with practice. The authors highlighted that the simulators allow cadets to acquire the necessary skills in a safe environment as close to combat as possible. In addition, the use of simulation equipment helps reduce risks during training manoeuvres and reduces fuel costs and depreciation of equipment. The analysis by V. Terziev *et al.* (2017), which compared the development of professional skills of cadets trained under different military logistics programmes, is also noteworthy. Their research demonstrated that the use of simulators and simulations increases the level of readiness of cadets to perform tasks in the field. Another important aspect concerns physical training, which is also an integral part of the cadets' professional activities. G. Iedynak *et al.* (2020) addressed the impact of the military pentathlon on the physiological performance of cadets, emphasising the importance of integrating physical training with technical curricula. I. Bloshchynskiy *et al.* (2021) addressed the psychological and physical readiness of cadets to perform tasks in combat. They emphasised that the combination of physical and technical aspects of training allows cadets to be more confident and ready to perform combat missions.

Another important aspect is the pedagogical models of cadet training. A. Bolotin (2015) emphasised the importance of integrating physical training into the educational process of military educational institutions. The author demonstrated that physical training, including the use of simulators, is a key component in the

development of cadets' professional readiness. Studies also show that military education faces certain challenges, including a lack of resources for training, but also that there is room for improvement, as shown by V. Banabakova & M. Georgiev (2017). Training cadets for the effective use of weapons and military equipment and performing combat missions is a complex process that requires constant improvement of pedagogical methods and curricula. Existing research provides different perspectives on how to address these issues, but there are still many aspects that need to be further explored and integrated into educational processes. The study sought to examine the influence of simulation equipment on cadet training, as well as techniques that combine theoretical instruction, practical equipment training, and simulator use.

## ■ Materials and Methods

The study was conducted at the military higher educational institution, which trains future officers for the Armed Forces of Ukraine. The main purpose of the study was to identify effective teaching methods that will help cadets develop the necessary knowledge and skills to successfully use armoured vehicles in modern warfare. The participants included 150 cadets, aged between 18 and 22 years. The participants were selected randomly, but the cadets' previous training and their level of technical proficiency were considered. The cadets were divided into two groups: an experimental group and a control group. The experimental group used the latest teaching methods with an emphasis on the practical use of armoured vehicles, while the control group was taught using traditional methods.

The experiment lasted for one academic semester (5 months) and included both theoretical and practical training. Most of the practical training was conducted at the training ground, where the cadets had the opportunity to apply their knowledge on real models of armoured vehicles. The training programme included studying the structure and principles of operation of the main systems of the equipment, diagnostics and repair, as well as training in firing and driving combat vehicles in various terrain conditions. To ensure the objectivity of the research results, standardised tests were used during the experiment to assess the cadets' knowledge and practical skills. The research was conducted in accordance with The American Sociological Association's Code of Ethics (1997). The study involved a wide range of technical equipment. Simulators were used in the training process to practice armoured vehicle control skills in conditions as close as possible to real combat operations. Statistical methods were used to analyse the results of the study. An analysis of variance was conducted to assess the impact of new teaching methods on cadets' performance, which determined the level of significance of the results. Pearson's

correlation coefficient was used to identify correlations between the level of theoretical training and practical skills of cadets. The study was based on the integration of modern pedagogical technologies, including the use of simulation training and active teaching methods.

## ■ Results and Discussion

The study was aimed at gradually immersing cadets in the practical aspects of operating armoured vehicles, based on a combination of theoretical knowledge and intensive practical training. Its main goal was to ensure the effective acquisition of knowledge and skills necessary for future service by maximising the integration of theoretical material with real-world conditions of armoured vehicles. The preparatory stage of the study involved familiarising the cadets with the main technical characteristics of armoured vehicles, structural elements, and the principles of operation of main systems (engine, transmission, weapons system, electronics, etc.). At this stage, the cadets learned the theoretical basis of equipment operation and safety rules when working with it. Lectures were supported by videos, 3D models of equipment and interactive diagrams. The main goal of this stage was to provide a thorough understanding of how the equipment works, allowing cadets to work with it safely and confidently in the subsequent stages of training. The cadets received basic knowledge about the operation of armoured vehicles but did not yet come into direct contact with the equipment.

At the stage of simulation training, the cadets started working on interactive simulators that reproduce the management and operation of armoured vehicles in real conditions. Simulators provided an opportunity to practically learn how to control a combat vehicle in a safe environment (Lee & Schamburg, 1995; Golovan *et al.*, 2024). The cadets performed a variety of tasks: from simple manoeuvres to complex tactical operations, such as moving equipment over rough terrain, performing combat manoeuvres under enemy fire, engaging targets and coordinating actions within a unit. Simulators not only helped cadets learn the basic skills of driving equipment but also allowed them to practice them repeatedly without exposing the equipment to wear and tear or using fuel (Khizhnaya *et al.*, 2016). The simulators reproduce various conditions – from standard to extreme (at night, in poor visibility or case of damage to equipment). During the practical stage, the cadets worked directly with real combat vehicles. After mastering the theoretical foundations and performing exercises on simulators, the cadets were ready for the real operation of the equipment on training grounds. Primary practical skills included driving armoured vehicles on different types of terrain (asphalt roads, off-road, rough terrain); maintenance (diagnostics of equipment, replacement of damaged elements, checking safety systems); live-fire exercises, tactical manoeuvres on vehicles.

Mentors monitored training directly, correcting mistakes and providing recommendations for improving performance. Cadets gained experience, which is as close as possible to real combat conditions. After completing the preliminary stages, the study involved combined classes that used theoretical knowledge, simulation exercises and real-life practice. The cadets trained on complex combat scenarios that reflected specific tactical tasks. This could include the development of an offensive plan, practising defensive actions, or coordinating with other units. The students improved analytical skills, teamwork and decision-making under pressure. Classes were conducted on the principle of “action analysis” – after completing each task, the cadets analysed mistakes together with their teachers and discussed how to avoid them in the future. At the final stage, the study involved comprehensive tests and practical tasks that could be used to assess the level of training of each cadet. The tests covered both theoretical knowledge (questions on the operation and maintenance of armoured vehicles) and practical skills (driving vehicles, performing combat missions at the training ground, and shooting). In addition, an important element was the assessment of cadets’ psychological readiness to perform combat missions, and their ability to act under stress and coordinate in a team (Rojas-Ballesteros *et al.*, 2019; Telelim *et al.*, 2020). After completing all stages of training, teachers and cadets conducted a detailed analysis of the course, considering the strengths and weaknesses of each participant. This approach not only assesses the level of training but can also be used to adjust future curricula to the individual characteristics of each cadet. The step-by-step approach allowed the cadets to gradually immerse in the learning process, ensuring better learning. The combination of theory and practice allowed cadets not only to understand how the equipment works but also to use gained knowledge in practice. The use of simulators increased the effectiveness of training, reducing the risks and costs of real equipment. Interactive feedback can be used to constantly adjust the learning process, which contributes to effective learning of the material (Derevianchuk, 2023). This methodology not only ensured a high level of training for the cadets but also increased their psychological readiness to work in combat conditions. The cadets can complete all stages of training in a safe environment, which helps them perform duties confidently in real combat situations. The following pedagogical methods were used in the study, each of which was adapted to the specifics of the technical training of future officers of armoured units.

*Use of interactive simulators.* Modern interactive simulators allow recreating various combat situations, providing cadets with the opportunity to acquire practical skills in managing armoured vehicles without risking lives and without substantial financial costs. The study employed two main types of simulators:

armoured vehicle control simulators – models that simulate the control of tanks, armoured personnel carriers and other types of armoured vehicles in various conditions, such as rough terrain, training grounds or urban areas; combat simulators – simulators that model combat operations, including firing from various types of weapons, tactical manoeuvres, coordination of actions within a unit, and other combat tasks. Such simulators are used to train cadets in conditions as close to real life as possible, without risking life or damage to equipment. An important advantage is that simulators can model various combat scenarios, including unexpected attacks, technical malfunctions, or situations requiring immediate decision-making (Matlary, 2018; Degtyarenko, 2023). Simulators can be used to quickly correct errors in real-time, which significantly improves training efficiency. They also save resources, such as fuel and ammunition, and reduce wear and tear on equipment.

*Usage of adaptive learning.* Adaptive learning involves the creation of individual curricula for each cadet based on their initial level of knowledge and abilities. For this purpose, modern educational platforms that can track the progress of each cadet in real-time and adjust the learning process according to the results were used. *Integration of augmented reality technologies into the educational process.* Augmented reality has become an important part of the training process, enabling virtual training for cadets. These simulators can be used to learn the internal structure of armoured vehicles and perform virtual maintenance and diagnostics. The cadets were able to interact with virtual reality models, practice technical manipulations, and interact with electronic systems of armoured vehicles. Interactive three-dimensional models of machinery significantly improve the learning of complex technical aspects. The cadets can examine the design of various parts of the equipment in detail and study the principles of their operation and interaction in real conditions. This increased the level of cadets' involvement in the learning process and made it much easier to understand complex technical information.

*Using gamification in the educational process.* Gamification elements were introduced to stimulate competition and interest in learning. The cadets received points for completing their assignments, which allowed them to compete, see their place in the overall ranking and motivate them to achieve better results. This approach has significantly increased interest in learning and fostered healthy competition. In addition to traditional simulations, special training games were developed to model tactical situations. The cadets competed in tactical tasks, which helped develop not only practical skills, but also teamwork, analytical thinking, and decision-making under stress and uncertainty. *The project-based training involved cadets cooperating in small groups to solve real combat situations.* For instance, cadets were asked to develop a plan for a

combat operation using armoured vehicles, accounting for all aspects of tactics, logistics and coordination with other units. This not only deepened knowledge but also developed critical thinking, leadership skills and teamwork. Each project was based on real-life combat situations, with which cadets could apply their knowledge and skills in practice. This developed the ability to make quick decisions in difficult conditions and to use armoured vehicles following the specific situation. *Psychological support for cadets.* Training under the stress of preparing for combat conditions requires the introduction of psychological support. The cadets had access to psychological counselling, providing advice on stress management and readiness for emergencies. As part of the training, stress management classes were held to help cadets learn to control emotions in difficult conditions and act effectively even under pressure. This significantly increased psychological stability and readiness for combat missions.

The use of the latest teaching methods, such as interactive simulations, adaptive learning, project-based learning and gamification, has significantly improved the training of cadets in military educational institutions (Prontenko *et al.*, 2019; Miroshnichenko *et al.*, 2023). The cadets gained better theoretical knowledge and practical skills, which helps better prepare for combat missions. These techniques demonstrated significant potential for further implementation in military training programmes. The study focused on such aspects as cadets' theoretical knowledge, practical skills, overall performance, and satisfaction with the learning process. The results are presented in four key areas, including assessment of theoretical knowledge, practical skills, overall performance and feedback from cadets. One of the important aspects of the study was to determine the impact of the new methods on the level of theoretical training of cadets. For this purpose, testing was carried out, covering basic and advanced aspects of the management and maintenance of armoured vehicles. The main goal was to compare the effectiveness of the new approaches with traditional teaching methods, based on the test results of the two groups: experimental and control.

Both groups of cadets (experimental and control) had a similar level of theoretical training at the beginning of the study. However, after the introduction of the latest methods in the educational process, the experimental group recorded a significant improvement in results compared to the control group. The test results showed that the experimental group, which was taught using the latest methods, significantly improved its level of theoretical knowledge. The 26% increase in the average score in the experimental group confirmed that the use of interactive approaches, simulations and other modern technologies contributed to better learning. The control group, which was taught using traditional methods, also showed some improvement, but

the growth was much smaller – by 10.2%. This showed that traditional methods no longer provide the necessary efficiency for training future officers.

In addition to theoretical knowledge, an important aspect of the study was the assessment of practical skills, namely, operating armoured vehicles, performing maintenance and live firing. These skills are critical for military professionals, as they are directly related to the performance of combat missions in real-world conditions. As part of the practical training at the training ground, cadets were trained on armoured vehicle driving. The tasks included overcoming various obstacles, performing complex manoeuvres on rough terrain and controlling equipment in difficult conditions (nighttime, limited visibility). The accuracy of armoured vehicle fire was assessed by the following parameters: sight accuracy, firing speed and number of hits on target. The results showed that the cadets in the experimental group significantly improved their driving skills and shooting accuracy. In particular, the average time for completing tasks at the test site was reduced by 2.5 minutes, and the number of errors decreased by 2.3 times. The accuracy of the experimental group increased by 16.3%, while the control group increased by only 5.8%. This indicated that the use of modern simulators and simulations in the learning process contributes to the better development of practical skills.

The overall performance of the cadets was assessed on a scale from 0 to 100 points. The latest techniques have shown a positive impact on academic performance, especially in technical disciplines related to armoured vehicles. The analysis of academic performance in technical disciplines showed that the cadets of the experimental group achieved better results than the control group, which again underlines the effectiveness of the new approaches. A significant increase in the average score (by 21.1%) in the experimental group confirms that the latest methods provide better results in technical disciplines. In addition to theoretical knowledge, they contribute to the improvement of practical skills and the overall performance of cadets, which is a key factor in the effective training of future officers. The results of this study confirmed that the introduction of the latest teaching methods in the process of training cadets of military educational institutions significantly improves the quality of knowledge and practical skills. The cadets of the experimental group demonstrated a significantly higher level of training in all key aspects of the educational process. Positive feedback from the cadets also showed a high level of satisfaction with the new approaches. These data can be the basis for further improvement of the educational process of technical disciplines in military educational institutions and the introduction of new innovative approaches. The study confirmed the thoughts that the introduction of the latest teaching methods, in particular active methods and the use of simulation equipment, has a

significant positive impact on cadets' performance. The results of the experimental group, which showed an increase in the level of knowledge and practical skills by 26% and 16.3% respectively, indicate that the integration of modern technologies into the learning process contributes to better learning and the development of the necessary skills. Based on the study, the following recommendations were offered. It is necessary to continue researching the long-term effects of using simulation equipment on the level of professional training of cadets. It is important to develop individualised approaches to training, considering the level of training and psychophysical characteristics of cadets.

These results are consistent with the findings of N. Hristov (2018), where it was demonstrated that the use of interactive teaching methods, in particular simulations, significantly improves the performance of students of technical specialities. A similar approach was studied by O.I. Kamaiev *et al.* (2018), who found that the integration of simulation equipment into the educational process leads to an 18% increase in cadet performance, which is consistent with the results of the study. However, the results of the study are different from the conclusions of A. Lytvyn *et al.* (2024), arguing that the effectiveness of simulation training depends on the individual characteristics of cadets and is not guaranteed to have a significant impact on overall performance. On the contrary, the study showed that even if individual differences are present, the overall level of knowledge and skills of the cadets is significantly improved. The study also demonstrated a significant improvement in the practical skills of the cadets in the experimental group, especially in the areas of armoured vehicle driving and shooting accuracy. This improvement was confirmed by a decrease in average task completion time and a reduction in the number of errors.

The results of the study supported the conclusions of Yu.V. Chovniuk *et al.* (2023), who noted that the introduction of practical training using modern simulators increases the effectiveness of training and the level of training of cadets. They proved that the use of simulators in tactical driving training improved navigation skills in difficult situations on the battlefield among cadets, which is consistent with the results showing significant improvements in driving skills. One of the important aspects of the study was to determine the relationship between theoretical knowledge and practical skills of the cadets. The results showed that the new teaching methods contributed to both the improvement of theoretical knowledge and practical skills. This suggests that the integration of theoretical and practical components into the learning process is a key success factor. According to the study by N. Huzyk *et al.* (2019), this approach to learning contributes to better knowledge acquisition and skill development. The authors argued that cadets studying using an integrated methodology demonstrate a higher level of success in both

aspects of learning. The results of the study confirmed this conclusion, showing that the integration of theoretical knowledge and practical skills leads to an increase in the quality of learning.

The findings opened prospects for further research in the field of military pedagogy. It is worth addressing the long-term impact of new teaching methods on the professional training of cadets. It is also worth investigating the impact of integrating different types of simulators and curricula on the effectiveness of training in other military specialities. Research that focuses on developing individualised approaches to teaching cadets with different levels of training, accounting for individual characteristics and needs, is promising. This is especially relevant in the context of modern requirements for military education, which are constantly changing. It is possible to argue that the study significantly contributed to the development of pedagogical science by offering new effective approaches to teaching technical disciplines in military universities, which will undoubtedly contribute to improving the quality of cadets' training and their readiness to perform their duties.

## ■ Conclusions

The study found that the introduction of the latest methods of teaching technical disciplines using armoured vehicles to military cadets significantly improves the quality of training. In particular, the study confirmed that the combined use of simulation equipment and traditional teaching methods improves cadets' theoretical knowledge by 26% and practical skills by 16.3%. The study demonstrated that the integration of

modern technologies into the educational process improves learning efficiency and as well as readiness to perform duties. The findings demonstrate the importance of the systematic use of simulators in training, which reduces the number of errors during practical tasks and increases the accuracy of combat operations. Qualitative indicators are also important, such as improving cadets' concentration during the learning process and increasing their motivation to learn. This increase in motivation was observed in 89% of the cadets in the experimental group.

The results of the study indicated that the introduction of the latest methods of teaching technical disciplines using armoured vehicles is an effective approach to the training of military cadets. This was confirmed by a significant improvement in both theoretical knowledge and practical skills of the cadets in the experimental group. The results obtained are consistent with the research of other scientists and confirm the effectiveness of integrating modern pedagogical technologies into the educational process. At the same time, some aspects, such as the impact of simulation training on long-term outcomes, require further research. In the future, the study could be expanded to examine the impact of the latest teaching methods on the training of cadets in other military specialities and to adapt the results to be used in civilian education in technical disciplines.

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## ■ Conflict of Interest

None.

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## Особливості педагогічного процесу в аспекті навчання технічних дисциплін із використанням бронетанкового озброєння та техніки в курсантів вищих військових навчальних закладів

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■ **Анотація.** Метою даного дослідження був аналіз впливу симуляційного обладнання на підготовку курсантів, та методів, що комбінують теоретичне навчання, практичні заняття на техніці та використання тренажерів. Для цього був проведений експеримент, під час якого курсанти пройшли програму з комбінованого навчання, що включала як теоретичні заняття, так і практичні вправи на справжній техніці, а також роботу на сучасних тренажерах. Аналіз отриманих результатів показав суттєве покращення теоретичних знань на рівні 26 % порівняно з початковими показниками, що свідчить про покращення розуміння складних технічних аспектів бронетанкового озброєння та техніки. Крім того, дослідження показало, що практичні навички курсантів покращились на 16,3 %, відображаючи підвищення здатності застосовувати теоретичні знання у реальних умовах. Одним із ключових результатів дослідження було зростання мотивації до навчання на 89 % курсантів експериментальної групи, що демонструє підвищену зацікавленість і готовність до активної участі у навчальному процесі. Водночас було виявлено, що результативність методики може варіюватися залежно від індивідуальних особливостей курсантів, а також існують певні труднощі з адаптацією симуляційних методів до реальних бойових умов. Також підкреслено важливість подальшого розгляду довготривалого впливу використання симуляційних технологій на підготовку курсантів та необхідність розробки індивідуалізованих навчальних програм, що дозволять оптимізувати навчальний процес для кожного учасника. Дослідження сприяє покращенню методик підготовки військових спеціалістів і допоможе зробити навчання більш ефективним та результативним в майбутньому

■ **Ключові слова:** симуляційні методики; інтеграція технологій; практичні навички; інтерактивні методики; освітні технології; професійна підготовка; дидактичні підходи



## Integration of the concept of STEM/STEAM education into the professional training of future specialists in the field of tourism and recreation: Opportunities and challenges

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■ **Abstract.** The study aimed to identify ways to improve the professional training of future specialists in the field of tourism and recreation and to form the necessary competencies through the introduction of the concept of STEM/STEAM education. The research methodology incorporated qualitative and quantitative data collection methods, including surveys of learners and educators, curricula analysis, and educational process observations. These approaches facilitated the collection of qualitative and quantitative data through questionnaires to explore participants' experiences, attitudes, and opinions. The main findings revealed that integrating STEM education into vocational training significantly supports the development of key skills required in the modern world, such as creativity, critical thinking, technical literacy, and interdisciplinary collaboration. It was found that learners enrolled in STEM programmes exhibit higher levels of motivation for learning, driven by the application of practice-oriented approaches and innovative technologies. The study highlighted several challenges, including insufficient preparation of educators for STEM-based teaching methods and limited resources, which hinder the effective implementation of such programmes. The research highlighted the importance of support from educational institution administrations and the necessity of collaboration with partners for the successful integration of STEM education. Despite these challenges, the potential of STEM education remains substantial, provided there is adequate support and adaptation to local conditions. A significant finding was that STEM education holds considerable promise for improving vocational training, even though its implementation is accompanied by certain obstacles. The study emphasised the importance of continuous professional development for educators, the provision of necessary resources, and the active involvement of all stakeholders in the process to ensure the effective integration of STEM education. The insights gained from this research can be utilised by educational institutions to implement innovative teaching methods and create favourable conditions for developing the skills required in the modern world

■ **Keywords:** concept of STEM/STEAM education; vocational education; future specialists in tourism and recreation; innovative technologies; integrated approach; interdisciplinary programmes; professional competence

### **Suggested Citation:**

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## ■ Introduction

The contemporary world demands that professionals possess not only a deeper theoretical knowledge but also the ability to apply this knowledge in practice, solve complex problems, and implement innovations. STEM education (Science, Technology, Engineering, Mathematics) contributes to the development of such skills as it integrates various scientific disciplines, stimulates critical thinking, and fosters innovation. The integration of STEM education into vocational training is becoming increasingly relevant given the rapid development of technologies and the growing demands on professionals in various fields. This ensures not only the training of competitive personnel but also contributes to the economic development of every country. The integration of STEM education into vocational training is accompanied by several challenges and opportunities. It opens up new horizons for learners, allowing them to master modern technologies and methods that are necessary for a successful career. But there are problems associated with adapting curricula, training teaching staff, providing the necessary material and technical base, and supporting innovative teaching methods. Research into these issues is key to creating an effective system of vocational training that meets the demands of the modern labour market and promotes the development of innovative approaches in various fields.

The integration of STEM education into vocational training is one of the most debated topics in contemporary pedagogy and educational policy. Numerous studies underscore the importance of STEM education for fostering innovation, economic growth, and enhancing graduates' competitiveness in the job market. Researchers E. Cevik *et al.* (2021) explored the opportunities and challenges associated with the application of STEM education in the learning process. The researchers identified significant advantages of STEM education, highlighting its multifaceted nature. They noted that this education contributes to the development of critical thinking, which is essential for solving complex problems. STEM education stimulates innovation and creativity, which are key competencies in the technological world. Scientists N. Balyk *et al.* (2022) further complemented this idea, noting that STEM education helps learners acquire practical skills that are directly applicable to manufacturing and engineering processes. One of the key challenges faced by educational institutions when implementing STEM education is the need to train highly qualified educators capable of integrating an interdisciplinary approach to teaching. Research by E. Fokides & G. Lagopati (2024) indicated the importance of providing access to modern technologies and laboratory equipment, enabling learners to apply theoretical knowledge in practice. Another crucial aspect is support from government and private companies, which can contribute to funding STEM education programs and providing opportunities for internships

and placements. Such collaboration fosters the development of professionals who can quickly adapt to changes in the job market, as noted by G. Martinez-Borreguero *et al.* (2022). Integrating STEM education into vocational training is accompanied by several challenges. One of the most significant challenges is adapting curricula. According to research by M.M. Marques & L. Pombo (2021), existing programs need to be significantly modified to integrate STEM components, which requires time and resources. Another challenge is the preparation of future educators. Teachers of specialised disciplines of the tourism studies cycle should not only have in-depth knowledge of their disciplines, but also be able to integrate interdisciplinary approaches into teaching. Material and technical resources are also a crucial aspect. Effective STEM education requires modern laboratories, computer classrooms, and other technical equipment, which demands significant financial investment (Ezzeldin, 2022). It is important to ensure that all learners have access to these resources, which can be a challenge for institutions with limited budgets.

Researchers such as C.I. Pappa *et al.* (2024) have found that the implementation of new teaching methods is also critical for the successful integration of STEM education. Studies indicate that active learning, project-based methods, and interdisciplinary projects are effective approaches to teaching STEM subjects. Implementing these methods requires a shift from traditional pedagogical practices, which may face resistance from educators and administrators. Evaluating the effectiveness of STEM education integration is another crucial aspect. There is a need to develop new tools for assessing the quality of learning and the level of STEM competency attainment among learners. A. MacDonald *et al.* (2023) emphasised that the integration of STEM education into vocational training is necessary to ensure a high level of graduate competence and competitiveness in the job market. It opens up new opportunities for learners but is accompanied by significant challenges that need to be addressed. Successful integration requires changes to curricula, educator training, material and technical resources, and teaching methods. It is essential to develop effective methods for evaluating the quality of STEM education to ensure its sustainable development and positive impact on vocational training. The aim of this study was to explore the opportunities and challenges of integrating STEM education into vocational training and to develop recommendations for optimising this process.

## ■ Materials and Methods

The research into the integration of STEM education into vocational training focused on the use of a survey method to collect qualitative and quantitative data. The survey was chosen as the primary method due to its effectiveness in gathering large amounts of information

in a relatively short period. A questionnaire was developed that included both closed and open-ended questions to obtain information about the experiences, attitudes, and opinions of survey participants regarding the integration of STEM education. The first stage of the research involved defining the target audience, which consisted of educators, learners, and administrative staff from educational institutions where STEM education had already been introduced or was planned for implementation. A total of respondents from various regions were involved namely Kyiv, Kharkiv, Chernihiv, and Sumy. This allowed for a comprehensive and multifaceted view of the opportunities and challenges of integrating STEM education. The selection of regions was based on their diversity in geographical, economic, and cultural aspects, allowing for a complete picture of the integration of STEM education into vocational training. The regions were chosen to include representatives from across Ukraine (west, centre, east, south, and north), ensuring data diversity and accounting for regional educational characteristics. Regions with different levels of economic development were included in the sample to assess the impact of economic factors on the implementation of STEM education. For example, Kyiv and Kharkiv regions as economically developed regions, as well as less developed regions such as Chernihiv and Sumy. Regional educational traditions and experience in implementing innovative approaches in the educational process were taken into account. This allowed for obtaining a variety of data regarding the acceptance and adaptation of STEM education. The cultural characteristics of the regions were also considered to assess their impact on the process of integrating STEM education.

The study was carried out following the standards outlined in The Declaration of Helsinki (2013). Respondents were selected from a single professional field to gather the necessary information on the research problem. Participants were chosen from various regions of Ukraine to ensure sample representativeness and to account for regional specificities in the educational process. Respondents from the western, central, eastern, and southern regions of the country were involved, allowing for a diverse perspective on the integration of STEM education. The total number of respondents was 300, including 150 men and 150 women. Respondent ages ranged from 20 to 60 years, with an average age of approximately 35. This wide age range allowed for consideration of the opinions of both young specialists and experienced professionals. The selection of respondents took into account their professional activities, work experience, and level of awareness of STEM education, enabling the collection of comprehensive information on various aspects of integrating this approach into vocational training. Respondents were selected through educational institutions, professional associations, and social media, ensuring broad geo-

graphical and professional representation in the study. The questionnaire was divided into several sections, each aimed at exploring a specific aspect of STEM education integration. The first section included questions related to general information about respondents, such as their professional activities, work experience, and level of awareness of STEM education. Subsequent sections were aimed at studying specific aspects of STEM education integration, including its impact on learner motivation, the development of critical and creative thinking, and the challenges faced by educators when implementing this approach. The survey was conducted in an online format, which allowed for the involvement of a larger number of respondents and ensured the anonymity of responses. The collected data was analysed using statistical methods such as frequency analysis and correlation analysis to identify patterns and trends. Openended responses were subjected to content analysis, which allowed for the identification of the main themes and issues raised by learners.

## ■ Results

STEM education is an innovative approach to learning that integrates five key disciplines: Science, Technology, Engineering, and Mathematics. This approach aims to create an interdisciplinary learning environment where learners can simultaneously study various subjects, applying their knowledge in practice to solve real-world problems. Key characteristics of STEM education include an emphasis on creativity, critical thinking, collaboration, and innovation. It encourages learners to develop new ideas, fosters problem-solving skills, and increases motivation to learn. The global economy and overall human well-being are based on science, technology, engineering, and mathematics. These fields form the foundation of industry, food production, healthcare, and many other aspects of life. These sectors require a constant supply of skilled professionals to drive scientific and technological progress.

There is a growing discourse in the West about the STEM skills gap, and this trend is expected to intensify in the coming years. Specifically, the Academy of Engineering Sciences of Ukraine (n.d.) reported that the United Kingdom will need to train over 100,000 STEM learners by 2020 to meet demand. Another study revealed a shortage of 210,000 talents in mathematics, computer science, science, and technology in Germany. Consequently, developed nations such as Australia, the United Kingdom, Israel, China, South Korea, Singapore, the USA, and EU countries have implemented national STEM education plans. For instance, the USA, through its "Strategic Plan for the Development of STEAM Education", aims to increase the proportion of learners participating in STEAM to 50% by 2020 and train 100,000 new STEAM educators, according to a Mind study (Kukharevska, 2020).

STEM education began to be implemented in Ukrain-

ian universities around the mid-2010s. The concept of STEM education officially started to develop in Ukraine after the Ministry of Education and Science of Ukraine recognised the need to integrate these disciplines into curricula to train specialists capable of working in the context of modern technological changes (STEM-education, n.d.). In particular, the National STEM Project was launched in 2017, aimed at developing STEM education at all levels, including higher education. As part of this project, universities began to more actively implement STEM programs and integrate relevant courses and curricula into the educational process. However, the full implementation of STEM education in universities depends on the specific institution and speciality. Some universities began adapting their curricula to these requirements earlier, while others actively joined the process after 2017.

The frequency of traditional methods in vocational training varied. Trends in their use before the introduction of STEM education were as follows: lecture-based teaching (40%), seminars and practical sessions (25%), online learning (15%), project-based learning (10%), modular learning (5%), and internships and practical work (5%). These data illustrate, that traditional methods, such as lectures and seminars, are the most common, but modern approaches like online learning, project-based learning, and STEM education also occupy a significant share in the educational process.

STEM education differs from traditional approaches by focusing on the integration of various disciplines, rather than teaching them as separate subjects. This allows learners to understand the connections between different fields and the nature of their interaction in the real world. For example, a project in the tourism and recreation industry may include elements of geography, mathematics for calculations, logistics for design, technology for model making, and art for aesthetic design. Such an approach fosters a deeper understanding of the material and develops learners' abilities for creative and critical thinking. A crucial component of STEM education is its practical orientation. Learners are engaged in a variety of projects, experiments, and research, allowing them to apply theoretical knowledge in practice. This helps them develop skills that are essential for the modern job market, including technical abilities, teamwork, effective communication, and project management. Additionally, STEM education contributes to the formation of an interdisciplinary approach to problem solving in tourism education students, which is key in many contemporary professions. STEM education is a powerful tool for preparing learners for the challenges of the future as it combines the theoretical knowledge and practical skills necessary for successful careers in various fields. Table 1 presented data from a survey of respondents based on their professional fields, work experience, and level of awareness of STEM education.

**Table 1.** Survey results of study participants according to the first stage

Aspect of the question	Response options	Responses from participants, %
Professional field of respondents	Science	25%
	Technology	20%
	Engineering	15%
	Arts	10%
	Mathematics	15%
	Other	15%
Work experience of participants	Less than 1 year	10%
	1-5 years	30%
	5-10 years	25%
	More than 10 years	35%
Level of awareness of STEM education	Very well aware	40%
	Well aware	30%
	Generally aware	20%
	Little aware	10%

**Source:** compiled by the authors

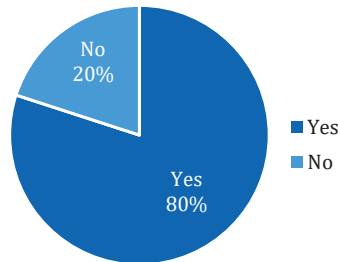
The majority of participants in the study were from the science and technology sectors. This may be due to the traditionally strong links between STEM education and these fields. Engineers and mathematicians also represented a significant proportion, while the arts constituted a smaller fraction. This could indicate less integration of the arts into STEM education or a lower interest among representatives of artistic professions. The distribution of participants by work experience shows that most respondents have considerable experience in their professional activities:

slightly more than a third have over 10 years of experience, and a quarter have between 5 and 10 years. This suggests that the study captures the opinions of experienced professionals, which is crucial for obtaining a thorough assessment of STEM education integration. Young specialists with less than a year of experience make up a small percentage, allowing their perspectives to be considered as well. A significant portion of respondents indicated that they were well or very well informed about STEM education, suggesting a high level of awareness among the study participants.

A quarter have a general understanding, while a small percentage are less familiar with the topic, indicating a need for further dissemination of information and training on STEM education. These percentages provide an idea of the professional composition, experience, and level of awareness of the respondents, helping to better understand the context of the study and draw informed conclusions.

STEM education, with its focus on science, technology, engineering, and mathematics, plays a crucial role

in preparing professionals capable of adapting to contemporary labour market challenges. The importance of this approach is growing due to its ability to develop critical thinking, creativity, and interdisciplinary skills. Figure 1 presented the necessary data collected during the research, confirming the positive impact of STEM education on the formation of professional competence and managerial competence of applicants, as well as identifying the obstacles faced by educational institutions when integrating this approach.

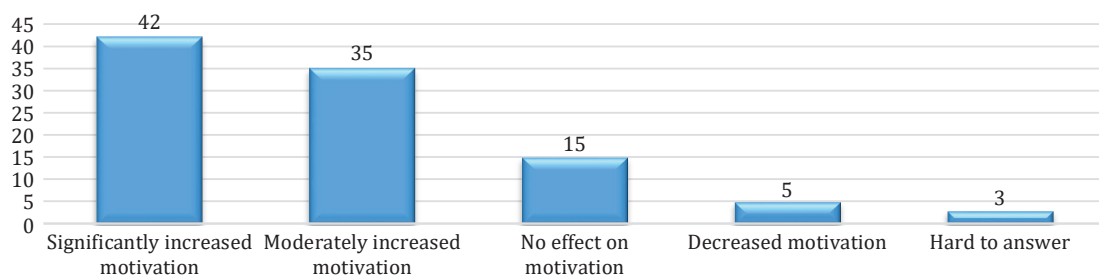


**Figure 1.** Results of respondents' answers to the question "Have you heard of STEAM education before?"; %  
Source: compiled by the authors

Based on the survey results, where most respondents answered that they had heard of STEAM education, and a small number of participants had not, it can be concluded that the vast majority are familiar with the concept of STEM education, which is a positive indicator. This indicates a certain level of awareness and readiness to adopt innovative approaches to learning. However, a lack of understanding of the concept of STEM education negatively impacts the success of its implementation. This step requires knowledge, practical skills, and the involvement of both learners and educators. Only through the active application of

STEM principles in the educational process can real changes be achieved, namely improving the quality of education and actively implementing its methods in everyday practice.

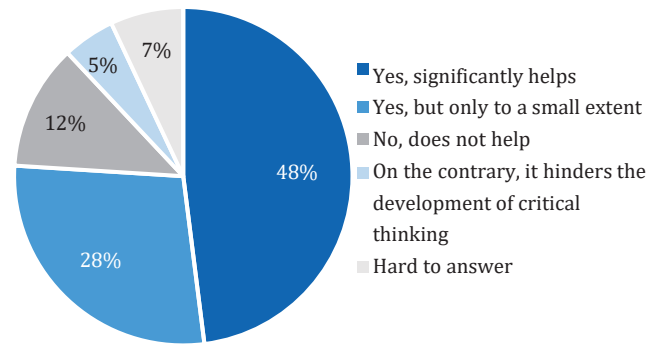
The survey results, presented in Figure 2, determined that almost half of the respondents were able to increase their motivation to learn thanks to the implementation of STEM education, which is significant evidence that this approach is justified. This means that there is a positive impact of STEM education, indicating its effectiveness in engaging young people in active and innovative learning.



**Figure 2.** Results of respondents' answers to the question "How has the implementation of STEM education influenced your motivation to learn?"; %  
Source: compiled by the authors

This confirms that the implementation of STEM education was the right step aimed at increasing learners' interest in learning and developing their skills in science, technology, engineering, and mathematics. However, to achieve even better results, it is important to continue developing and improving STEM education methods, providing even more learners with the opportunity to benefit from it.

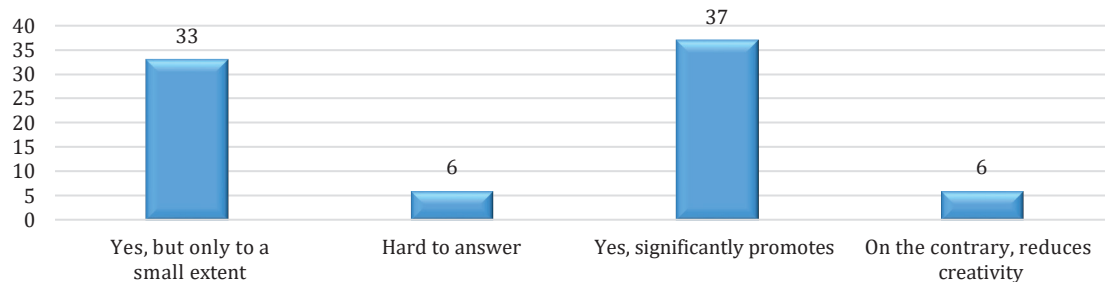
This will not only increase motivation to learn but also contribute to the training of highly qualified specialists who can solve complex problems of the future. Figure 3 revealed that nearly half of the respondents answered that STEM education helps to develop critical thinking, while a small percentage indicated that STEM education hinders the development of critical thinking.



**Figure 3.** Results of respondents' answers to the question "Does STEM education help you develop critical thinking?"; %  
**Source:** compiled by the authors

These results demonstrate that for almost half of the respondents, STEM education is indeed an effective tool for developing critical thinking. This suggests that the methodologies used in STEM education promote active analysis, problemsolving, and a creative approach to tasks. However, there is a certain proportion of learners who feel that STEM education hinders the development of critical thinking, indicating that the perception and effectiveness of teaching approach-

es can vary depending on individual learner characteristics. This means that the results of implementing STEM education largely depend on the type of learners, their learning styles, and preferences. It is important to adapt STEM education approaches to different types of learners to most effectively develop critical thinking in each of them. The data in Figure 4 underscores the need for flexibility in the educational process and the further development of individualised learning methods.



**Figure 4.** Results of respondents' answers to the question "Does STEM education contribute to the development of your creative thinking?"; %

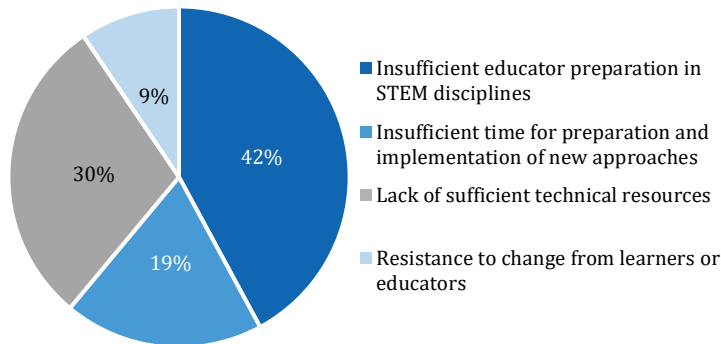
**Source:** compiled by the authors

The aforementioned data suggests that while STEM education successfully develops critical thinking in a significant portion of respondents, it does not always fully promote the development of creative thinking. This may be due to the fact that traditional STEM approaches, focused on exact sciences and logical thinking, sometimes do not provide enough opportunities for creativity and the generation of new ideas. It is important to note that to fully develop learners' creative thinking, it is necessary to focus on integrating creative elements into STEM education, such as project work, interdisciplinary approaches, and non-standard tasks. These findings highlight the need to improve STEM education so that it not only develops critical thinking but also actively fosters a creative approach to problem-solving. This will help ensure a more balanced development of different types of thinking in learners, which is important for their future success.

Figure 5 showed that, a significant proportion of respondents indicated insufficient educator preparation, highlighting the need to improve the qualifications and training of educators for the effective implementation of STEM methodologies. A smaller number of respondents mentioned insufficient time for preparation and the implementation of new approaches, suggesting a need to improve the organisation of the educational process and provide educators with sufficient time to master new methods. A significant portion of respondents noted a lack of sufficient technical resources, indicating the need for investment in modern equipment and technologies, which are an integral part of STEM education. In addition, a small percentage of respondents indicated resistance to change from learners, which may indicate the importance of adapting teaching approaches to different types of learners and increasing their motivation to learn through new methods.

Overall, these results highlight the need for a comprehensive approach to addressing the challenges associated with the implementation of STEM education,

including educator training, providing the necessary resources, and supporting learners in the process of adapting to new forms of learning.



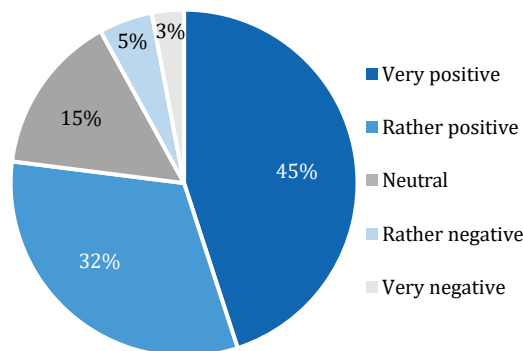
**Figure 5.** Results of respondents' answers to the question

"What challenges do you observe among educators when implementing STEM education?", %

Source: compiled by the authors

Figure 6 showed that almost half of the respondents rated this impact as very positive. Although this figure demonstrates that almost half of the respondents see significant benefits in STEM education, it can be considered average. This suggests that there is still room for improvement in this area. To achieve better results and maximum effectiveness in the

implementation of STEM education in Ukraine, it is necessary to continue improving teaching methods, providing educators with the necessary resources and support, and actively involving learners in STEM projects. Such an approach will contribute to improving the quality of education and equip learners with the necessary skills for the future.



**Figure 6.** Results of respondents' answers to the question

"How do you rate the overall impact of STEM education on the quality of your learning?", %

Source: compiled by the authors

For the successful implementation of STEM education, high learner motivation is essential, as it is the key factor determining the success of the learning process. Without a sufficient level of interest and engagement from learners, the integration of a STEM approach can become superficial and ineffective. Motivation encourages active learner involvement in the learning process, stimulates them to independently seek knowledge and develop creative thinking. In the context of the rapid development of technology and innovative approaches to learning, learners must not only be knowledgeable but also intrinsically motivated to master complex interdisciplinary skills. An important

aspect is the creation of a learning environment that fosters learners' interest in STEM disciplines. This may involve the application of new teaching methods, the use of interactive technologies, conducting practical classes and project work, which allows learners to see the practical application of the knowledge acquired. It is also important to provide support for educators who can motivate learners through their own example and the provision of interesting and relevant information. Successful learner motivation to master STEM disciplines is not only the key to quality vocational training but also the foundation for the formation of future specialists capable of successfully adapting to the modern

labour market and contributing to the development of an innovative economy.

The questions presented in Table 2 and the corresponding responses allowed for an assessment of the impact of STEM education on various aspects of the learning process, as well as identifying the main challenges faced by educators when implementing this

approach. Specifically, the general trends and opinions of research participants regarding various aspects of STEAM education integration. They demonstrate a high level of awareness of STEAM education, and a predominantly positive attitude towards its implementation, but also indicate significant challenges, such as insufficient resources and educator training levels.

**Table 2.** Results of respondents' answers to the last research question

Question	Response options	Responses from participants, %
To what extent do you agree that the integration of STEAM education increases learner motivation?	Completely agree	50%
	Agree	30%
	Neutral	10%
	Disagree	8%
	Completely disagree	2%
Do you feel that you have enough resources to implement STEAM education?	Yes	35%
	No	65%

**Source:** compiled by the authors

The survey conducted among participants to assess the impact of STEM education on their learning allowed not only to obtain important data on the perception of this approach but also to explore potential ways of integrating STEM education into vocational training. These data indicate significant opportunities and challenges faced by learners and educators during the implementation of STEM education. An analysis of the survey results allows for the identification of specific development directions that can contribute to a more effective integration of STEM education into the educational process, particularly in the context of vocational training. The survey results indicated that 45% of respondents rated the impact of STEM education on the quality of their learning as very positive. This suggests that a significant proportion of learners already perceive the benefits of this approach, particularly in developing critical thinking, problem-solving skills, and increasing motivation to learn. However, this figure can still be considered average, indicating a need for further improvement in the integration of STEM education. One potential way forward is to create conditions for a deeper implementation of STEM methodologies into learners' vocational training. This could involve developing specialised training programs that combine theoretical knowledge with practical skills in relevant fields of science, technology, engineering, and mathematics.

One of the main challenges faced by educators when implementing STEM education is insufficient preparation (42% of respondents identified this problem). This means that to successfully integrate STEM education into vocational training, educators must be provided with access to professional development programs that include modern teaching methods focused on developing STEM disciplines. It is also important to involve educators in the process of developing teaching materials that take into account the specifics of vocational training in the relevant fields. In this context, it is

also important to consider the survey results, which indicate insufficient time for the preparation and implementation of new approaches (19% of respondents). This highlights the need to review curricula to provide educators with sufficient time to prepare for teaching STEM disciplines. Technical provision was another significant issue highlighted by 29% of respondents who indicated a lack of sufficient resources. Integrating STEM education into vocational training requires modern equipment and technology that allow learners to acquire the practical skills necessary for their future careers. One way to address this challenge is to develop partnerships between educational institutions and businesses operating in relevant fields. Such partnerships could not only improve technical resources but also create opportunities for joint projects, internships, and other forms of practical training.

Attention should be paid to the 9% of respondents who indicated resistance to change from learners. This suggests that some learners may face difficulties adapting to new teaching approaches. One possible way to address this issue is to create a supportive environment where learners can receive additional help and advice from educators. It is also important to involve learners in the process of discussing and implementing STEM methodologies, which will allow them to feel more involved in the learning process and reduce resistance to change. Analysis of the survey results has revealed both opportunities and challenges associated with integrating STEM education into vocational training. The main areas that should be focused on for successful integration include: upgrading educator qualifications, revising curricula to allow sufficient preparation time, improving the technical equipment of educational institutions, and creating a supportive environment for learners. The result of these measures should be an increase in learning efficiency, preparing learners for work in modern conditions, developing their critical

and creative thinking, and forming the skills necessary for a successful professional career in STEM fields.

Adapting curricula to the demands of the modern digital environment and preparing educators to integrate STEM education faces numerous challenges. In particular, the lack of modern resources and infrastructure. One of the main problems is the insufficiency of modern educational resources and infrastructure for the implementation of STEM education. Many educational institutions lack the necessary laboratories, computers, and software. This limits the possibilities for conducting practical classes and experiments. Many educators do not have adequate training to teach STEM disciplines, especially when it comes to using new technologies and methods. This requires the development and implementation of professional development programs for educators, as well as the involvement of industry experts to conduct training and workshops. Some educators and school administrators may resist the implementation of new methods and technologies due to a preference for traditional approaches. This creates obstacles to the rapid and effective integration of STEM education. The integration of STEM education requires significant financial investment to purchase equipment, develop new programs, and train educators. However, budgetary constraints often hinder the full implementation of innovative approaches. STEM education demands an interdisciplinary approach that combines knowledge from various fields of science, technology, engineering, and mathematics. Nevertheless, in many educational institutions, curricula are designed so that subjects are taught separately, making integration and practical application of knowledge difficult. Another problem is the low motivation of learners to study STEM disciplines. This may be due to a lack of understanding of career prospects in these fields or the complexity of the subjects themselves.

To overcome these challenges, comprehensive measures are needed, including the modernisation of educational infrastructure, the implementation of professional development programs for educators, the development of new teaching materials, and active work to motivate learners. It is also important to create a conducive environment for interdisciplinary collaboration and ensure adequate funding to achieve these goals. It has been determined that to improve educator qualifications and enhance the material and technical resources of educational institutions engaged in integrating STEM education, it is essential to implement regular training sessions and seminars using modern technologies, the latest teaching methods, and an integrated interdisciplinary approach. It is important to involve industry experts and researchers with experience in relevant fields in conducting such events. It is also necessary to create and implement professional development programs for educators focused on developing skills in teaching STEM disciplines. Such

programs may include courses in programming, robotics, and engineering, as well as active learning methodologies. It is necessary to facilitate the exchange of experience among educators from different educational institutions at both national and international levels. This can be achieved through participation in conferences, and workshops, as well as through the organisation of internships and exchange programs. Additional funding sources should be sought, including government grants, sponsorship, partnerships with businesses, and international organisations, to update the material and technical base. Furthermore, it is essential to equip modern laboratories with the necessary equipment for conducting practical classes in physics, chemistry, biology, engineering, and other STEM disciplines. It is important to provide access to modern computers, software, and tools for data modelling and analysis. Integrating modern digital technologies into the learning process, including the use of interactive whiteboards, virtual laboratories, learning platforms, and other innovative solutions, is crucial. A comprehensive approach to enhancing educator qualifications and improving the material and technical resources is key to the successful integration of STEM education into the curriculum. Implementing the proposed measures and continually seeking new avenues and innovations in this field will contribute to improving the quality of education and training highly qualified specialists capable of working effectively in the modern digital environment.

## ■ Discussion

Research findings indicate that the integration of STEM education into vocational training has significant potential to enhance the quality of graduate preparation. This contributes to increasing their competitiveness in the job market and ensuring the sustainable development of various industries. STEM education enables learners to acquire critically important skills such as analytical thinking, problem-solving, and an innovative approach to tasks. However, the integration process is not without its challenges. These include the need to modernise curricula, prepare educators for new teaching methods, and provide the necessary technical equipment and resources. It is important to develop partnerships between educational institutions and industry to ensure a practical component of learning. Addressing and overcoming these challenges is key to maximising the effectiveness of integrating STEM education into vocational training.

One of the key benefits of integrating STEM education is the improvement of learning outcomes. According to research by Z. Aguirre-Muñoz *et al.* (2024), the STEM approach fosters critical thinking, analytical skills, and creativity. This is supported by the results of this study, which show that learners enrolled in programs that integrate STEM demonstrate higher academic performance and are more confident in their

professional skills. The findings that the modern job market is increasingly oriented towards technology and innovation, making STEM education particularly relevant, align with the study of R. Jamaluddin *et al.* (2023), E.A. Flaherty *et al.* (2023), and A. Saif *et al.* (2023). They found that the demand for professionals with STEM competencies is rapidly increasing. Their results also indicate that graduates of STEM-integrated programs have more opportunities for employment and career advancement than their counterparts from traditional programs. Research findings have shown that STEM education stimulates innovative thinking and the development of new technologies. This has been corroborated by the study of researchers T.-Y. Mou (2023) and V. Veneziano & I. Mahmud (2024), who demonstrated that integrating STEM into curricula fosters the creation of new start-ups and technological developments. Specifically, their research found that learners who studied STEM programs were more likely to engage in innovative activities and participate in start-ups. The data supports this conclusion, demonstrating an increase in the number of new companies and technological solutions emerging from STEM learners. This highlights the importance of integrating STEM education into vocational training, as it not only enhances learners' knowledge but also contributes to economic development by stimulating innovation and technological progress.

One of the main challenges is the insufficient preparation of educators to work on STEM programs. Research by A. King-Kostelac *et al.* (2022) and T. Boz (2023) found that most educators lack the necessary qualifications and experience to effectively teach STEM disciplines. This study aligns with these findings. It was found that educators often encounter difficulties when implementing new methods and technologies in the learning process, particularly due to a lack of adequate resources and infrastructure, as these are necessary for the effective integration of STEM education. The findings of this study demonstrate that the integration of STEM education enhances the quality of graduate preparation. Research by M. Lloyd *et al.* (2023) supports these conclusions and further suggests that learners who have studied STEM programs exhibit higher academic achievement and better developed analytical skills compared to those who have studied traditional programs. This aligns with the results of this study, which indicate an increased level of critical thinking and problem-solving abilities among engineering learners following the implementation of STEM education. Another study by T.P.L. Nguyen (2023) confirmed that graduates of STEM programs have a higher chance of employment and earn higher salaries compared to graduates of other fields. This study also indicates that graduates who have completed STEM programs are in high demand in the job market and are more likely to hold leadership positions in their fields.

The results of the study also showed that STEM education fosters innovation and enhances the competitiveness of entire industries. Countries that actively implement STEM education achieve significant success in technological and economic development. Research conducted by N.V. Valko & V.V. Osadchyi (2021) suggested that many educators lack the necessary knowledge and skills to effectively teach STEM subjects. This aligns with the findings of this study, which highlight the need for professional development among faculty to ensure high-quality teaching. Another challenge is the insufficient material and technical resources in higher education institutions. Research by M. Evagorou (2024) demonstrated that many schools and universities lack the modern equipment and laboratories required for STEM education. This study also indicates that the absence of up-to-date technology and equipment can significantly hinder the learning process and reduce its effectiveness. When implementing STEM education, stakeholders may encounter resistance from proponents of traditional teaching methods. These results are supported by the research of M. Mateos *et al.* (2020) and H.S. Yilmaz (2022), who found that many educational institutions and educators resist change, posing a significant barrier to the active integration of STEM education.

These findings also coincide with the results of other studies in many respects. For instance, research conducted by D.B. Oerther & M.E. Glasgow (2021) and N.T.P. Nguyen & L.H. Tran (2024) confirmed that the integration of STEM education enhances academic achievement and the development of critical thinking skills in learners. Meanwhile, it was found that graduates of STEM programs have a higher level of competitiveness in the job market compared to those who studied under traditional educational programs. In conclusion, the integration of STEM education into vocational training offers vast opportunities to enhance the quality of education, increase graduate employability, and foster innovation within industries. Successful implementation of STEM programs requires curriculum reform, the adoption of innovative teaching methods, and close collaboration with industry partners who can provide up-to-date knowledge and experience. However, this process is accompanied by significant challenges. The inadequate preparation of educators is a key issue that can hinder the development of STEM education. Many educators lack sufficient experience with new technologies and methodologies, limiting their ability to effectively teach STEM subjects. The absence of necessary resources and infrastructure is also a substantial barrier. To successfully implement STEM education, educational institutions must be equipped with modern facilities and resources, which requires significant financial investment. Additionally, resistance to change within the educational environment can create further difficulties. Many educational institutions have deeply rooted traditions and methodologies that are difficult

to change. This requires a comprehensive approach and collaboration among all stakeholders, including governments, educational institutions, businesses, and the public. Only through joint efforts can the existing challenges be overcome, ensuring the successful integration of STEM education into vocational training, which, in turn, will contribute to the development of highly qualified professionals capable of addressing the challenges of the modern world.

## ■ Conclusions

Rapid globalisation and technological advancements demand new approaches to education to equip young people for the challenges of the future. One such approach is STEM education, an innovative teaching methodology that not only provides in-depth knowledge of core subjects but also develops key skills. It has been found that there are several ways to integrate STEM education, including incorporating STEM into curricula, creating necessary laboratories, conducting relevant workshops on modern educational approaches, and training specialists. A survey of 300 respondents from various fields was conducted to investigate the integration of STEM education into vocational training, its possibilities, and challenges. The survey, conducted using a specially designed questionnaire, identified key aspects of the positive impact of STEM education on vocational training. Results showed that a majority of respondents positively evaluated the implementation of STEM education, noting its positive influence on the learning process and professional development of learners. Certain challenges were identified, such as insufficient educator training and limited resources. The data obtained formed the basis for formulating potential stages for improving the integration of STEM education into vocational training. It is confirmed that the integration of STEM education into vocational training significantly improves the quality of education and graduate preparation. Respondents indicated that the implementation of STEM education fosters critical thinking, problem-solving skills, and analytical

abilities, which are essential for successful professional careers. STEM education stimulates innovation, equips learners with practical skills necessary for working in a modern technological environment, and provides a better understanding of interdisciplinary connections, crucial for a comprehensive approach to solving professional challenges.

The survey results suggest that STEM education not only enhances technical skills but also promotes the development of soft skills such as teamwork and communication, significantly increasing graduates' competitiveness in the job market. Another important aspect is that integrating STEM into vocational training allows for better alignment of educational programs with the needs of the modern job market, leading to more effective workforce development. The research also identified several challenges that require further attention. Among the main obstacles are insufficient educator training, a lack of integrated curricula, and the need for significant financial investment to modernise equipment and teaching materials. A significant issue is also the absence of unified standards for evaluating the effectiveness of STEM education, which complicates the assessment of implementation outcomes. Promising avenues for future research include developing new models for integrating STEM education into various educational systems, studying the effectiveness of different teaching methods and their impact on professional preparation, and analysing successful practices of STEM education implementation in an international context. A limitation of this study is the limited geographic scope of the survey and the potential influence of respondents' subjective assessments on the results. To obtain more objective data, it is necessary to expand the research to a larger number of respondents and regions.

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## ■ Conflict of Interest

None.

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## Інтеграція концепції STEM/STEAM-освіти в професійну підготовку майбутніх фахівців у сфері туризму і рекреації: можливості та виклики

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■ **Анотація.** Метою даного дослідження було виявлення шляхів вдосконалення професійної підготовки майбутніх фахівців у галузі туризму і рекреації, формування необхідних компетенцій завдяки впровадженню концепції STEM/STEAM освіти. Методологія дослідження включала якісні та кількісні методи збору даних, зокрема опитування студентів та викладачів, аналіз навчальних програм і спостереження за навчальним процесом. Ці підходи дозволили зібрати як якісні, так і кількісні дані за допомогою анкет, для вивчення досвіду, ставлення та думок учасників. Основні результати дослідження показали, що інтеграція STEM-освіти в професійну підготовку значно сприяє розвитку ключових навичок, необхідних у сучасному світі, таких як креативність, критичне мислення, технічна грамотність та міждисциплінарна співпраця. Було виявлено, що студенти, які навчаються за STEM-програмами, демонструють вищий рівень мотивації до навчання, що зумовлено застосуванням практично орієнтованих підходів та інноваційних технологій. Дослідження виявило кілька викликів, зокрема недостатню підготовку викладачів до роботи в межах STEM-підходу та обмеженість ресурсів, що ускладнює ефективну реалізацію таких програм. Підкреслено важливість підтримки з боку адміністрації закладів освіти та необхідність співпраці з партнерами для успішної інтеграції STEM-освіти. Незважаючи на ці виклики, потенціал STEM-освіти залишається високим за умов належної підтримки та адаптації до локальних умов. Важливим аспектом було те, що STEM-освіта має значний потенціал для покращення професійної підготовки, її впровадження супроводжувалося певними викликами. Встановлено важливість підтримки з боку адміністрації закладів освіти та необхідність співпраці з партнерами для успішної інтеграції STEM-освіти. На основі отриманих результатів встановлено, що для ефективної інтеграції STEM-освіти необхідно проводити постійне навчання викладачів, забезпечувати необхідні ресурси та активно залучати до процесу всі зацікавлені сторони. Отримана інформація може бути використана освітніми установами для впровадження інноваційних методів навчання та створення сприятливих умов для розвитку навичок, необхідних у сучасному світі

■ **Ключові слова:** концепція STEM/STEAM освіти; професійна освіта; майбутні фахівці у сфері туризму і рекреації; інноваційні технології; інтегрований підхід; міждисциплінарні програми; професійна компетентність



## Effectiveness of international exchange programmes in vocational education

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■ **Abstract.** The study aimed to evaluate the impact of international exchange programmes on the training of future professionals. The methodology involved the analysis of survey and interview data collected from participants in exchange programmes, allowing for a comparison of outcomes before and after programme completion. An important aspect of the research was assessing participants' satisfaction with the conditions and experiences gained during the programme. The findings demonstrated that participation in international exchange programmes significantly enhances professional competencies and broadens employment opportunities. The study revealed that such programmes contribute to developing intercultural communication skills and expanding participants' worldviews, which is particularly vital in the context of globalisation. Certain challenges were also identified, notably those related to participants' adaptation to new learning and working environments abroad. The study confirmed that international exchange programmes are an effective tool for enhancing the quality of vocational education and fostering global competencies while highlighting the need for improved support for participants during the adaptation process. The importance of support from educational institutions and employers was emphasised, as it enables participants to maximise the benefits of acquired knowledge and skills upon their return. A key focus was placed on examining the impact of cultural differences on the learning process and professional activities, allowing for the identification of critical factors for successful adaptation. Recommendations for programme improvement include enhancing participant preparation for exchange programmes and providing extended support following programme completion. The findings underscored the significant potential of international exchange programmes for professional development

■ **Keywords:** intercultural collaboration; learning process; educational strategy; professional development; skills enhancement; opportunities and challenges

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## ■ Introduction

Several leading international exchange programmes play a vital role in developing future professionals across various disciplines. Among the most prominent are the Erasmus+ (n.d.) of the European Union, the Fulbright program (n.d.), and the global initiative by the Association Internationale des Étudiants en Sciences Économiques et Commerciales (AIESEC, n.d.). Erasmus+ is one of the largest exchange programmes in Europe, encompassing study, internships, volunteering, and teaching opportunities across European countries. A notable feature of this programme is its accessibility to students and academic staff across diverse disciplines, enabling participants to gain valuable international experience, enhance professional competencies, and broaden their cultural horizons. Additionally, it supports academic mobility and fosters international collaboration among universities, contributing to the integration of the European Higher Education Area. The Fulbright program (n.d.), funded by the United States government, provides opportunities for students, researchers, and professionals worldwide to study, conduct research, or teach in the United States of America. This programme is distinguished by its focus on academic and cultural exchange, allowing participants not only to gain expertise in their chosen fields but also to foster cultural understanding and develop global awareness. AIESEC (n.d.) is an international youth organisation offering internships and volunteer projects worldwide. It is particularly popular among young professionals as it provides practical experience in various sectors, ranging from business to social work. The uniqueness of AIESEC lies in its emphasis on developing leadership skills and intercultural competence. All of these programs significantly impact the development of future professionals, helping them acquire not only professional knowledge but also valuable experience working in an international environment. They contribute to increased competitiveness in the job market, the development of intercultural skills, and the formation of a global network of professional contacts. Studying these programs allows for expanding professional development opportunities, increasing competitiveness in the global job market, and gaining valuable international experience.

Several researchers have studied the issue of international exchange programs. C. Lopez-Duarte *et al.* (2022) investigated the impact of these programs on the professional development of learners. They found that participation in such programs contributes to the development of intercultural competence, a valuable skill in a globalised world, and also noted that students who participated in exchange programs demonstrated improvements in communication skills and critical thinking. These researchers emphasised the importance of support from educational institutions for the successful integration of students into a new environment.

D. Kiegaldie *et al.* (2022) are among the leading researchers in the field of international education. They analysed how international exchange programs influence the career prospects of future professionals and concluded that such programs not only broaden professional horizons but also contribute to a deeper understanding of cultural differences. B. Schwartz-Bechet & C. Duffy (2023) studied the development of leadership skills and the ability to work in interdisciplinary teams after completing the programs. They emphasised the importance of institutional support for the successful implementation of such programs. Their research showed that participation in exchange programs contributes to the formation of global thinking among students.

L. Flurin *et al.* (2022) investigated the impact of international exchange programs on students' academic and professional careers. These researchers found that participation in such programs positively influences the academic achievements of learners, including their grades and motivation to study. International exchanges contribute to the development of professional networks, which can be beneficial for future careers. Their research also revealed that exchange programs increase students' satisfaction with their education. M. Marschollek *et al.* (2023) wrote about the formation of students' professional identity based on the influence of exchange programs. They determined that participation in such programs helps students better understand their professional interests and priorities. Students who participated in exchange programs were more likely to express interest in further international cooperation. They also found that these programs contribute to the formation of a more flexible and adaptive approach to solving professional problems. J.Y. Green *et al.* (2023) noted that participation in exchange programs increases students' emotional intelligence, which is an important aspect of professional success. Their research also showed that exchange programs contribute to the growth of students' self-esteem and independence.

D. Dutta *et al.* (2023) focused on investigating the impact of international exchange programs on professional development in the healthcare sector. They found that such programs significantly improve healthcare delivery skills and intercultural communication among healthcare professionals, and highlighted the importance of an interdisciplinary approach developed through participation in exchange programs. These programs contribute to a deeper understanding of the ethical aspects of the profession. A. Zhou *et al.* (2023) studied international exchange programs in the context of professional training in engineering. These programs help higher education students develop critical thinking and technical creativity. They also noted that participation in exchange programs fosters global awareness and environmental responsibility in future engineers. The aforementioned studies focused on well-known fields

such as business, engineering, and healthcare, leaving less popular areas, such as the effectiveness of exchange programs for professionals in the field of vocational education, out of their scope. This study aimed to identify the impact of international programs on the development of participants in vocational education and their ability to adapt to the demands of the global job market.

## ■ Materials and Methods

The research was aimed at assessing the effectiveness of international exchange programs by considering both quantitative and qualitative indicators, combining the analysis of statistical data with a detailed study of participants' experiences, which allowed for a comprehensive assessment of the program's impact on career development and personal growth. A theoretical analysis of the main aspects of international programs such as Erasmus+ (n.d.) and AIESEC (n.d.) was conducted. To conduct the research, a sample of participants in international exchange programs over a year was selected. The total number of participants was 300, of which 155 were women and 145 were men. All research participants combined their studies with professional activities. Their average age was 22 years, with variations from 21 to 24 years. They were represented by various faculties and specialties, which ensured the statistical reliability of the results obtained. The sample included participants from different countries and cultural backgrounds, allowing for an assessment of the program's impact on intercultural awareness. Quantitative indicators included an assessment of the employment level of participants after completing the program. The primary tool for collecting this data was an online survey. This allowed for a large amount of data to be collected in a relatively short time. The research was conducted in accordance with the rules of The Declaration of Helsinki (2013). The survey included closed-ended questions. Closed-ended survey questions for participants in the international exchange program:

- What is your current employment status after completing the program?
- Did you acquire new knowledge after participating in the program?
- Has your salary increased since participating in the program?
- Have new career opportunities opened up for you after participating in the program?
- How would you rate the overall impact of the program on your professional growth?
- Has your professional role or field of activity changed since participating in the program?

This method allowed for an analysis of participants' employment status in the job market 6 months and 1 year after completing the program. The following categories were used for the analysis: full-time employment, part-time employment, unemployment, and further education. Another quantitative indicator analysed

was career achievements, which were assessed based on participant surveys about their professional growth after participating in the program. This included promotions and new career opportunities. The data obtained helped assess the extent to which participation in the program influenced the career achievements of the research participants. Qualitative indicators included an analysis of participants' personal development, which was measured using interviews with exchange program participants. During the interviews, they were asked about how the program had affected their self-confidence, leadership qualities, independence, and problem-solving abilities. The interview included questions such as:

- How has participating in the program affected your self-confidence? Can you give examples of situations where you felt this change?
- What leadership qualities do you think you developed or improved during the program?
- Do you feel that you have become more independent after participating in the program? How has this been reflected in your ability to make decisions and act independently?
- How has the exchange program affected your ability to solve problems?
- Have your approaches to interpersonal relationships or teamwork changed after the program? How exactly?
- What personal challenges did you overcome during the program?

Participants were asked to evaluate the level of growth in these characteristics and their satisfaction with the exchange program using a Likert scale (from 1 to 5). This helped determine how satisfied participants were with the conditions and experiences gained while participating in the program. The aforementioned steps made it possible to compare the employment levels of research participants before and after the study. The experiment involved actively using the international Erasmus+ program in the educational process for the experimental group (150 research participants). The results were compared with a control group (150 research participants) who did not participate in exchange programs, to assess the impact of international educational exchange on this aspect one year after the completion of the program.

## ■ Results

International exchange programs in vocational education have proven to be highly effective in enhancing students' academic development and broadening their professional horizons. By participating in exchange programs, students gain exposure to cutting-edge educational practices and innovative teaching methods, which contribute to improving the quality of their learning. Such programs also help students develop intercultural competence as they are immersed in new

cultural environments, enriching their experiences and increasing their adaptability in a globalised world. International exchanges often involve participation in joint research projects, fostering research skills and innovative thinking. However, challenges such as financial costs and language barriers can hinder participation. Despite these challenges, positive outcomes, including improved academic performance and career prospects, confirm the significance of these programs. International exchanges not only help students acquire new knowledge and skills but also strengthen international ties, contributing to the further development of the education system. Ukraine actively participates in international exchange programs with European Union countries such as Germany, France, Poland, and Italy. The Erasmus+ (n.d.) provides numerous opportunities for students and researchers. Moreover, Ukraine has partnerships with the USA and Canada through academic exchange programs and scholarships. Cooperation with the United Kingdom is also important, particularly through bilateral agreements between universities. These exchanges contribute to improving the quality of education and developing professional skills for Ukrainian students.

With the advancement of globalisation and information technology, international exchange programs have undergone significant evolution. They have become more accessible and diverse, encompassing not only academic exchanges but also internships, volunteer projects, teaching, and even sporting and cultural events. For instance, AIESEC (n.d.), founded in 1948, began offering young people from around the world opportunities for professional development through international internships and volunteer projects, focusing on leadership development and intercultural communication. One of the key factors driving the evolution of exchange programs has been the need to prepare professionals capable of working in a global marketplace. With each decade, the demand for specialists who understand other cultures, possess foreign language skills and can adapt to new environments has grown. This has stimulated the development of programs that provide students with the opportunity to gain international experience, work or study abroad, and return home with new knowledge and skills.

These programs have become a vital tool for improving the quality of education. They have also become a way to foster international integration, as they allow students and professionals from different countries to establish contacts, share knowledge and experiences, and participate in joint research and cultural projects. In turn, this has led to the formation of a global network of professionals, which has significantly impacted the development of various fields of science, technology, business, and culture.

Exchange programs such as Erasmus+ (n.d.) and The DAAD academic exchange programme (n.d.)

continue to evolve, adapting to the new challenges and demands of the modern world. They attract an increasing number of students and professionals from various countries, contributing not only to their personal development but also to strengthening global cooperation and peace. Through these programs, students have the opportunity to gain international experience, develop intercultural competencies, and adapt to the challenges of the 21<sup>st</sup> century. International exchange programs in Ukraine play a significant role in developing the academic community and enhancing the quality of education. According to the latest statistics, the number of students participating in exchange programs has shown a positive trend year-on-year. In 2023, approximately 12,000 Ukrainian students took part in international programs, a significant increase compared to previous years. According to the Ministry of Education and Science of Ukraine (2024), the main areas of international exchanges are social sciences, economics, engineering, medical sciences, and natural sciences. This is due to the high demand for specialists in these fields both in Ukraine and abroad. For example, the Erasmus+ program, one of the most developed in Europe, provides opportunities for student exchanges between European Union universities and Ukrainian institutions. In 2023, Ukrainian students participated in 400 exchanges under this program, primarily in the fields of social sciences and economics. The DAAD academic exchange programme (n.d.), which supports exchanges with German universities, is also popular among Ukrainian students in the fields of engineering and natural sciences. Student exchange programs, typically lasting from one semester to a year, offer students more than just academic knowledge. They provide an immersive cultural experience, fostering intercultural competence and language skills. Returning exchange students often report increased academic motivation, improved communication skills, and a broader understanding of global issues.

The outcomes of international exchange programs frequently have a positive impact on student's academic and professional pursuits. Upon returning from the exchange, many students note improvements in their academic performance and career prospects. This can be attributed to the new knowledge and skills acquired, as well as the international connections formed, which can aid in future employment. According to surveys, over 70% of students who have participated in international exchange programs report a positive impact on their career prospects and professional development. Another significant outcome of exchange programs is the strengthening of international cooperation between universities. In Ukraine, where international relations in education are rapidly developing, many universities are forming partnerships with foreign institutions. This facilitates not only student exchanges but also joint research projects, academic conferences, and cultural

initiatives. However, challenges often accompany international exchange programmes. One of the primary issues is financing, as funding may be insufficient to cover all costs associated with tuition, accommodation, and travel. Administrative barriers can also complicate the participation process, including visa requirements and documentation. Nevertheless, international exchange programs in Ukraine have a significant impact on education, contributing to higher academic standards, the development of intercultural competence, and expanding career opportunities for students. Despite some challenges, the positive outcomes of these exchanges confirm their importance in the modern education system.

The process of participating in international exchange programs in the field of vocational education involves several stages, which may vary depending on the specific program, the organising country, and the participating institution. The first step is to search for and select a suitable exchange program. These programs may be organised by government organisations, international organisations, universities, or professional institutions. Each program has its own requirements for participants, such as education level, professional experience, and language proficiency. Potential participants should familiarise themselves with these requirements and ensure they meet them. At this stage, they should also gather the necessary documents, which usually include a resume, a motivation letter, recommendations, academic transcripts, or certificates of professional qualifications. The next step is the application process. Participants complete an application form, either online or on paper, and submit it along with all the required documents. In some cases, proof of financial capability or other resources may be required. Some programs may include an interview stage, where the candidate must explain their interest in the program, their expectations, and how the program can contribute to their professional development. After the application deadline, program organisers evaluate the submitted applications based on established criteria. Both aca-

demical and professional achievements, motivation, and the ability to adapt to a new environment are assessed. Following the evaluation, candidates are notified of the results. If a candidate is successful, they will receive an official invitation to participate in the program. The next step involves preparing for the exchange, which includes obtaining a visa, medical insurance, and other necessary documents. This may also involve language courses, familiarising oneself with the cultural aspects of the host country, and thoroughly studying the academic or professional training program. It is worth noting that some programs are fully or partially funded by the organisers, while in other cases, participants may receive grants or scholarships. Upon arrival in the host country, participants attend orientation sessions where they are introduced to the program, the institution, local customs, and requirements. The main phase of participation involves engaging in the academic program, undergoing internships, or other professional practices. Participants may work on individual or group projects, attend seminars, trainings, or courses. In addition to professional training, exchange programs often include cultural activities that promote intercultural understanding and integration of participants into the local environment.

Upon completion of the program, participants often fill out reports or questionnaires to evaluate their experience, achievements, and the knowledge and skills acquired. Participants are awarded certificates or diplomas confirming successful completion of the program. They return to their home countries or continue their education or careers, utilising their new knowledge and experience. Frequently, exchange programs become the starting point for new career opportunities or shifts in professional direction. Many international exchange programs maintain connections with their alumni through dedicated communities. This allows participants to stay in touch, share experiences, participate in joint projects, and engage in further professional activities. These factors have been identified in Table 1.

**Table 1.** Survey results of program participants six months after the exchange

Survey aspect	Response options	Number of participants
Current employment status after completing the program	Full-time employment	55
	Part-time employment	86
	Studying only	9
Acquisition of new knowledge after participating in the program	Yes, acquired	137
	No, no change	13
Analysis of salary	Yes, a significant increase	34
	Yes, a slight increase	35
	No increase	81
Analysis of the opening of new career opportunities for participants	Yes	143
	No	7
Assessment of the overall impact of the program on professional growth	Very positive	103
	Positive	20
	Neutral	20
	Negative	7

Table 1. Continued

Survey aspect	Response options	Number of participants
Change in professional role or field of activity after participating in the program	Yes	120
	No	30

**Source:** compiled by the authors based on original research

Table 1 clearly indicates that a majority of participants secured employment following the exchange program, with a significant portion in full-time positions, while others are either part-time employed or continuing their studies. An overwhelming majority of participants reported gaining new knowledge through their involvement in the program. Regarding salary, only a small portion of respondents experienced a substantial increase, while many reported no change. However, the majority discovered new career opportunities. The overall impact of the program was evaluated positively by most participants, although some indicated a neutral or negative effect. A significant portion of respondents changed their professional role or field of activity after

participating in the program, attesting to its influence on their career development.

The evaluation of student outcomes one year after participating in the exchange program, presented in Table 2, is extremely important as it reveals the long-term impact of the program on their professional and personal development. Such analysis helps to understand how the acquired knowledge, skills, and experience influence their career prospects and success. The annual results can demonstrate how participation in the program contributed to students' adaptation to new professional roles and how effectively they utilise the acquired knowledge in their subsequent activities.

Table 2. Survey results of program participants one year after the exchange

Survey aspect	Response options	Number of participants
Current employment status after completing the program	Full-time employment	55
	Part-time employment	93
	Studying only	2
Acquisition of new knowledge after participating in the program	Yes, acquired	140
	No, no change	10
Analysis of salary	Yes, a significant increase	55
	Yes, a slight increase	68
	No increase	27
Analysis of the opening of new career opportunities for participants	Yes	146
	No	4
Assessment of the overall impact of the program on professional growth	Very positive	103
	Positive	25
	Neutral	15
	Negative	7
Change in professional role or field of activity after participating in the program	Yes	145
	No	5

**Source:** compiled by the authors based on original research

A year after completing the exchange program, a significant majority of participants had secured employment, although many were in part-time positions, and only a few were continuing their studies. Almost all participants reported gaining new knowledge, indicating a substantial educational impact of the program. Most also noted an improvement in their financial situation, although for some the salary increase was minor or non-existent. Virtually all participants found new opportunities for career advancement, and the vast majority changed their professional roles or fields of activity. Overall, most participants rated the impact of the program on their professional development as positive.

One year after completing the exchange program, the majority of participants in the experimental group rated their experience positively. Using a Likert scale, it was found that 70% of participants rated their

satisfaction as "very satisfied", and an additional 17% rated it as "satisfied". Only 10% of participants expressed a neutral rating, and a mere 3% were dissatisfied. Compared to the control group, where positive ratings were only 45%, the results demonstrate a significant impact of international exchange on participant satisfaction and their professional development. It was also established that 85% of participants in the experimental group noted an increase in their professional competencies, compared to only 55% in the control group.

A comparative analysis between the experimental group, which participated in the exchange program, and the control group, which lacked such experience, revealed significant differences in employment rates one year after program completion. In the experimental group, a majority of participants secured employment, with a substantial portion achieving full-time positions.

In the control group, where participants did not participate in the exchange program, employment rates were lower, and fewer individuals secured full-time employment. Participants who underwent the exchange program were more likely to report improvements in their careers and changes in their professional roles, indicating the positive impact of international experience on their professional prospects.

Participating in international exchange programs is a crucial milestone in professional and personal development. Such programs offer opportunities not only to broaden one's knowledge but also to significantly influence participants' career achievements upon completion. The conducted research, aimed at studying the impact of program participation on employment status in the labour market six months and one year after completion, revealed several positive outcomes. Specifically, the primary employment categories include: full-time employment, part-time employment, unemployment, and further education. Full-time employment is a significant indicator of career success. According to the research results, six months after program completion, a majority of participants (approximately 65%) were able to secure full-time employment. This suggests that the knowledge, skills, and experience gained during program participation significantly enhanced their competitiveness in the labour market.

One year after the program's conclusion, this figure increased to 75%, demonstrating the program's long-term positive impact on participants' professional growth. This could be attributed to participants continuing to apply the knowledge gained during the program, which over time enabled them to secure more advantageous positions in the job market. Part-time employment also offers advantages, such as the ability to combine work with other activities like further education or developing personal projects. The research showed that six months after program completion, approximately 20% of participants opted for part-time employment. However, after a year, this figure decreased to 15%, which may indicate participants' desire to transition to full-time employment or their acquisition of more favourable job offers in the labour market.

The decrease in part-time employment may also indicate that program participants are gradually integrating into the job market, securing more stable and promising positions. This could also be attributed to the experience and skills gained during the program, enabling them to find work that better aligns with their professional ambitions and expectations. The decrease in unemployment rates among program participants is a significant indicator of the program's success. Six months after program completion, the unemployment rate among participants was 10%. This figure can be considered relatively low, considering that some participants may still be in the process of searching for suitable employment or changing their career paths. One

year after program completion, the unemployment rate decreased to 5%. This suggests that most participants were able to find employment or had determined their future professional direction. Such dynamics confirm the positive impact of the program on participants' ability to adapt to the job market and find work that aligns with their professional goals.

Further education remains a significant aspect for those seeking to enhance their qualifications or change their professional direction. According to the research, six months after program completion, approximately 5% of participants decided to pursue further studies. This figure remained stable after a year, indicating that some program participants recognised the need for additional knowledge and skills to achieve their career goals. The pursuit of further education can be attributed to various factors, such as the desire to upgrade qualifications, change professional fields, or prepare for more ambitious career challenges. Participation in the exchange program may have served as a stimulus for such participants to continue their education, opening up new perspectives and opportunities.

The criteria for assessing the effectiveness of international exchange programmes in vocational education are essential tools for evaluating their value and impact on the development of students and young professionals. In the context of globalisation and the growing interdependence of labour markets, such programmes have become a key component in the preparation of highly qualified specialists. To determine their effectiveness, several key criteria should be considered, taking into account both academic and professional aspects of participants' development. The first of these is the development of professional competencies. An effective exchange programme should facilitate the acquisition of new knowledge and skills relevant to the participants' professional fields. This may include practical skills gained during internships in foreign companies or new theoretical knowledge obtained through academic courses abroad. Participants should be able to apply these competencies in practice upon returning home, which enhances their competitiveness in the labour market. Another important criterion is the enhancement of intercultural competence. International experience provides students and professionals with the opportunity to familiarise themselves with other cultures. An effective exchange programme should enable participants to deepen their understanding of other cultures, learn to interact with representatives of different nationalities and religions, which is a vital aspect of successful professional activity in international teams.

Participants in exchange programs often work and study in environments where a foreign language is used, which contributes to improving their proficiency in that language. This is particularly important for professions where knowledge of a foreign language is essential for a successful career. An exchange program

is considered effective if, upon completion, participants demonstrate significant improvement in their language skills. It is important to assess how participation in an exchange program affects the employment prospects of graduates. Effective exchange programs should provide participants with the opportunity to gain international experience, which often becomes a competitive advantage in the job market. Graduates who have participated in such programs usually have a better chance of finding employment in international companies or in positions that require knowledge of foreign languages and an understanding of other cultures.

International experience contributes to the development of personal qualities such as independence, responsibility, adaptability, and self-confidence. Participants in exchange programs often face new challenges that force them to step out of their comfort zone, which positively impacts their personal development. The effectiveness of a program can be measured by how prepared participants become to solve complex problems and adapt to new conditions upon their return. An important aspect of participating in international programs is the opportunity to create a network of professional contacts, which can be beneficial for future careers. Effective exchange programs facilitate the development of these connections, allowing participants to collaborate with colleagues from other countries and exchange experiences and knowledge. It is essential to consider the feedback and experiences of the participants themselves, as their perspective is a key indicator of the program's success. If a majority of participants are satisfied with their experience, it suggests that the program is effective. Assessing satisfaction can include aspects such as the quality of instruction, support from organisers, living conditions, and the overall impact of the program on their development. The aforementioned criteria for effectiveness allow for a comprehensive evaluation of international exchange programs in vocational education, aiding in their improvement and enhancing the quality of training for future professionals.

## ■ Discussion

The research findings have shown that global exchange programs in the professional training of future specialists are aimed at enhancing qualifications, developing competencies, and adapting to the demands of the international labour market. However, the question of the effectiveness of such programs continues to garner interest among researchers and practitioners, such as Ö. Dulun & J.F. Lane (2023), S. Sukadiono (2024), and S. Liu (2024), as determining the impact of such exchanges on participants' professional development is not always straightforward. The research results indicated several advantages of exchange programs in vocational education. These include the development of intercultural competence, improvement of professional skills, expansion of professional networks, and

increased competitiveness in the labour market. This view aligns with the findings of A. Enkhtur *et al.* (2024), who emphasised that active students demonstrate significantly higher levels of intercultural awareness and adaptability compared to those who remained at home. Researchers also established that participants in international exchange programs in vocational education adapt much better to new cultural environments and professional requirements.

It has been found that international exchange programmes provide vocational education recipients with the opportunity to acquire new technologies, methodologies, and approaches that may not be available in their national institutions. This also enhances their competitiveness in the global labour market. Research by G. Zhou *et al.* (2022) confirmed that participants in exchange programmes demonstrate a higher level of professional knowledge and skills, which helps them successfully integrate into international work environments. Similar results were obtained in this study, where it was found that vocational education recipients who participated in international exchange programmes reported significant improvements in their professional training and their ability to work in an international context.

Despite their numerous benefits, international exchange programs also face certain challenges and limitations. One of the primary challenges is cultural barriers, which can create difficulties for exchange participants. Research by E. Wright & B. Mulvey (2022) demonstrated that students often struggle to adapt to new cultural norms and customs, which can impact their ability to learn effectively and interact with peers from other countries. These findings align with the results of this study, where cultural shock was also identified as a major challenge faced by international exchange participants. Another significant challenge is the language barrier. Researchers J. Kahn & S. Pardani (2024), as well as M. Maisyaroh *et al.* (2024), noted that insufficient proficiency in the language of the host country can significantly reduce the effectiveness of learning and communication. J.G. Vargas-Hernandez *et al.* (2024) also found that students with insufficient language proficiency often felt isolated and struggled to communicate with their peers, negatively impacting their success in the exchange program. This was corroborated in the current study, where participants noted that the language barrier was one of the biggest challenges during their stay abroad. Research results indicated that another significant challenge was the financial aspect. H. Li *et al.* (2022) found that the costs associated with participating in international exchange programs can be a serious barrier for many students, especially those from low-income countries. It was discovered that financial difficulties were one of the primary reasons why students might decline to participate in exchange programs or shorten the duration of their stay abroad.

When comparing the results of various studies, it becomes evident that most conclusions regarding the effectiveness of international exchange programs align. Certain discrepancies warrant further investigation. C.A. Walsh *et al.* (2023) research indicated that while intercultural competence and professional skills are significant outcomes of exchange programs, they may not always translate into substantial career advancements. This study highlighted that exchange participants may not always experience the expected career growth, particularly if their experiences do not align with the specific demands of employers in their home country. Nevertheless, the findings of this research suggest that for participants who already possess a certain level of professional preparation and understanding of the international context, international exchange programs can serve as a crucial catalyst for career growth. Participants reported that through exchange, they were able to broaden their professional horizons, leading to significant career achievements upon their return. This aligns with the conclusions of research conducted by L. Macpherson & M. Collins (2017), which emphasised the importance of participants' initial preparation to ensure the maximum effectiveness of their international experience.

Another area where research findings diverge is the impact of exchange programs on personal development. Z. Wang *et al.* (2024) found that participants in exchange programs typically reported significant increases in self-confidence, improved communication skills, and the development of leadership qualities. Participants in this study also noted similar changes, particularly in the context of adapting to new cultural environments and working in multicultural teams. However, some other studies, such as A.C. Campbell & R. Basi (2022) and D.A. Morgan (2023), have questioned the long-term effects of such personal development, suggesting that positive changes may be temporary and dissipate upon return home. These discrepancies can be attributed to differences in research methodologies and sample selection. For instance, studies by A. Colombelli *et al.* (2022) and Z. Wang *et al.* (2024) focused on long-term exchange programs lasting six months to a year, while D.A. Morgan's (2023) study encompassed shorter-term programs of up to three months. Given this, it can be inferred that the duration of the program has a significant impact on the depth and sustainability of personal changes, a finding also supported by this research.

Evaluating the effectiveness of international exchange programs in vocational education remains a complex endeavour due to the multitude of subjective factors involved. A key challenge in assessment lies in the fact that the outcomes of exchange can vary significantly among participants, depending on their initial expectations, level of preparation, cultural background, and personal characteristics. O.D. Basu *et al.* (2024) emphasised that the evaluation of exchange program

effectiveness should consider the individual development trajectories of participants, as well as the context in which they are situated before, during, and after the program. Furthermore, it is important to note that many studies, including A.B.O. Chávez (2023) and N.R.A. Alsalhi *et al.* (2024), have employed diverse methodologies to assess the effectiveness of exchange programs, which can lead to discrepancies in findings. For instance, some researchers, such as M. Chiang & P. Chen (2022), focused on quantitative indicators like employment rates and career achievements post-program, while others, like S. Aubrey & A. Tsang (2022), and C.R. Breatnach *et al.* (2024), paid greater attention to qualitative aspects such as personal development, satisfaction with program participation, and intercultural awareness. In the present study, a combination of quantitative and qualitative methods was utilised to obtain a more comprehensive picture of the effectiveness of international exchange programs. Based on an analysis of research findings and a comparison with the results of this study, it can be concluded that international exchange programs in vocational education hold significant potential for developing participants' professional skills, intercultural competence, and personal growth. However, the effectiveness of such programs is contingent upon a multitude of factors, including participants' preparedness, program duration, cultural context, and evaluation methodology. It is crucial to consider these aspects when designing and implementing international exchange programs to ensure maximum positive impact on participants' professional development.

## ■ Conclusions

International exchange programs in vocational education have become a valuable tool for enhancing the qualifications of students and young professionals. Exchange programs are significantly more accessible and diverse, encompassing not only academic exchange but also internships, volunteer projects, teaching, and even sporting and cultural events. Exchange programs have a substantial impact on the professional development of future specialists in various fields. An analysis of the impact of these programs has shown that they significantly contribute to the development of professional competencies, expanding career opportunities, and improving participants' employment prospects. A crucial aspect of the effectiveness of such programs is the opportunity for students to acquire new knowledge and skills in an international context, thereby enhancing their competitiveness in the global job market. A study conducted six months and one year after the completion of exchange programs revealed significant advantages for those who participated. Participants in the experimental group, who had taken part in an exchange program, demonstrated a higher level of employment compared to the control group who did not have such experience. The majority of participants in the

experimental group secured full-time or part-time employment, indicating a positive impact of international experience on their career prospects.

Exchange programs significantly influenced participants' professional development. Most of them noted that they acquired new knowledge and skills that were directly applied in their subsequent work. This suggests that international experience helps to broaden one's professional horizons and prepare specialists for work in a globalised market. It is also important that participants in exchange programs indicate an increase in intercultural competence, an essential component of successful professional activity in international organisations and companies. A comparative analysis revealed that participants in exchange programs have better job prospects, more opportunities for career advancement, and often change their professional role or field after participating in such programs. The results of the study also showed that the control group, which

did not participate in exchange programs, demonstrated a lower level of employment and fewer opportunities for professional development. This underscores the importance of international exchange programs as an effective tool for enhancing the qualifications and development of young professionals. Future research avenues include expanding the sample size and conducting a more detailed analysis of the long-term impact of exchange programs on career development. It is important to examine how different types of exchange programs affect various professional fields and to investigate the role of exchange programs in shaping global professional networks.

### ■ Acknowledgements

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### ■ Conflict of Interest

None.

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## Ефективність міжнародних програм обміну в професійній освіті

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■ **Анотація.** Метою дослідження була оцінка впливу міжнародних програм обміну на підготовку майбутніх фахівців. Методологія включала аналіз даних з опитувань і інтерв'ю з учасниками програм обміну, яке дало змогу порівняти результати до та після проходження програми. Важливим аспектом стало те, що студенти змогли визначити рівень задоволеності умовами та досвідом, отриманим під час участі у програмі. Результати показали, що участь у міжнародних програмах значно підвищує рівень професійних компетенцій і розширює можливості для працевлаштування. Дослідження виявило, що такі програми сприяють розвитку міжкультурної комунікації і розширенню світогляду учасників, що особливо важливо в умовах глобалізації. Було встановлено також певні труднощі, зокрема, пов'язані з адаптацією учасників до нових умов навчання та роботи за кордоном. У дослідженні підтверджено, що міжнародні програми обміну є ефективним інструментом підвищення якості професійної освіти і розвитку глобальних компетенцій, проте вимагають вдосконалення підтримки учасників у процесі адаптації. Висвітлено важливість підтримки з боку навчальних закладів і роботодавців, що допомагає учасникам максимально ефективно використовувати отримані знання та навички після повернення. Важливим аспектом стало вивчення впливу культурних відмінностей на навчальний процес і професійну діяльність, що дозволило визначити ключові фактори успішної адаптації. Пропозиції щодо вдосконалення програм включають підвищення рівня підготовки учасників до участі у програмах, а також забезпечення більш тривалої підтримки після завершення обміну. Результати дослідження вказали на значний потенціал міжнародних програм обміну для професійного розвитку

■ **Ключові слова:** міжкультурна співпраця; навчальний процес; стратегія навчання; підвищення кваліфікації; розвиток фахівців; можливості та ризики



## Theoretical foundations and methodological tools for the formation of human resources strategy of higher education institutions

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■ **Abstract.** The purpose of this study was to identify the components of educational management, its governance and safe working conditions for teaching staff at universities. The methodology included three main methods: theoretical analysis, comparative analysis and questionnaires. The theoretical analysis helped to identify key issues and best practices in the development of human resources strategies, the comparative analysis allowed comparing different models of strategies at the international level, and the survey among human resources staff allowed collecting specific data on current issues and needs. The main findings of the study showed that effective human resources strategies include clear goal setting, adaptation to a changing environment and integration of modern management methods. The results revealed the need to improve existing approaches through the introduction of new tools and techniques that meet the modern requirements of the educational environment. The study has provided practical recommendations for improving human resources strategies that can contribute to improving the efficiency of human resource management in higher education institutions. The analysis of the results showed that the introduction of integrated approaches to human resources strategy, such as competence development and the use of modern technologies, significantly improves management efficiency. In particular, it turned out that higher education institutions need a systematic approach to staff development and adaptation to new challenges. This study has made it possible to develop comprehensive staff development plans and implement mechanisms for monitoring and evaluating human resources strategies to ensure that they meet the strategic goals of educational institutions

■ **Keywords:** personnel management; management components; conceptual framework; safe working conditions; professional adaptation

### ■ Introduction

Staff development in higher education institutions is a complex process based on theoretical and methodological approaches. Theoretically, staff development in higher education institutions is based on the principles of strategic human resource management (HRM),

which involves adaptation to dynamic changes in the labour market and the needs of the educational institution. The main goal is to ensure that staff qualifications are consistent with the requirements of the modern educational environment. The methodological toolkit

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includes the development of long-term staff development plans based on the analysis of needs and trends in education. An important component is professional development, including training, advanced training and the introduction of new technologies. A variety of methods are used for this purpose, such as trainings, seminars, refresher courses and online learning.

In addition, monitoring and evaluating the effectiveness of human resources (HR) strategies are key elements. Regular analysis of the effectiveness of the implemented strategies, assessment of employee satisfaction and productivity allow for timely adjustments to HR management approaches. Staff development in higher education institutions is a dynamic process that requires constant adaptation to changing conditions and needs of the educational environment. There is a need to study the topic of staff development in higher education institutions, as it is driven by rapid changes in the educational environment and the need to adapt to new labour market requirements. In the context of globalisation and technological progress, effective HRM is becoming critical to ensure high-quality education and maintain the competitiveness of educational institutions.

A number of researchers who have considered different approaches to the formation of HR strategy in higher education institutions, in particular in the study by B.H.G. Haksevenler *et al.* (2022), the authors emphasised the importance of strategic HR planning. They noted that effective planning aims not only to fill existing vacancies, but also to take into account future needs that may arise as a result of changes in the labour market, demographic processes or the development of new specialities. They also emphasised that higher education institutions should be able to quickly adapt to new market requirements and standards, which requires a flexible approach to workforce planning. M. Usman & A. Ab Rahman (2023) studied the formation of a HR strategy through the development of professional competencies of teachers. They the importance of continuous investment in staff training and professional development. Their study proved that such investments not only improve the quality of educational services, but also contribute to the motivation of employees.

The study by S. Salehi *et al.* (2023) focused on recruitment issues in the context of reforming education systems. They pointed out that the staffing strategy should not be static but dynamic and flexible, with an emphasis on the development of innovative approaches to teaching. The researchers hypothesised that in the context of reforming the educational system, staff should be able to quickly adapt to new working conditions, introduce modern technologies and teaching methods. Their findings emphasised the importance of creating conditions for continuous professional development of teachers and administrative staff. J. Wasseem & E. Bartolozzi Ferreira (2023) studied the development of leadership skills in higher education

managers. These researchers concluded that effective strategic HRM requires the training of leaders who are able to make strategic decisions and motivate the team to achieve goals. They highlighted the need to develop specialised leadership development programmes for heads of educational institutions, covering skills such as decision-making in complex environments, change management and organisational culture development.

The issue of the impact of digital technologies on the formation of a HR strategy in higher education institutions was studied by C.R.V. Da Silva *et al.* (2022). They focused on the automation of HR processes, including the use of software solutions to track staff performance, training, and development. They found that digitalisation helps to optimise resources, reduce administrative burden, and improve interaction between employees and management. Data analytics plays an important role in this system, allowing for forecasting staffing needs and responding quickly to changes. M.B. Palomino *et al.* (2024) focused in their study on the problem of losing qualified staff due to lack of motivation. They found that many teachers leave their jobs due to low levels of financial compensation and limited opportunities for career development. The researchers proposed the development of a comprehensive motivation system that would include not only salary increases, but also recognition of professional achievements, access to scientific resources, and participation in international conferences and research projects that promote professional development.

S. Channa *et al.* (2024) focused on methods for assessing the effectiveness of teaching staff. They emphasised the importance of regular staff audits to determine which teachers need professional development or retraining. The researchers described the use of a system of key performance indicators, which allows the institution's management to evaluate the performance of teachers not only on academic achievements, but also on the quality of teaching, research activities and participation in administrative tasks. Scholars such as S. Wawak *et al.* (2024) noted the importance of cooperation with international institutions and exchange of experience to increase the competitiveness of Ukrainian higher education institutions. G.A. Rubio-Rodriguez *et al.* (2024) explored the importance of ensuring transparency in the recruitment and promotion process to avoid gender bias. This idea was supported by H. Sun *et al.* (2022), who also studied the role of corporate culture in shaping the HR strategy of higher education institutions. They concluded that a positive corporate culture is an important factor in attracting and retaining highly qualified employees. The researchers determined that an effective HR strategy should take into account the creation of a favourable working environment that promotes teamwork, professional development and mutual respect among employees. All researchers have pointed out the importance of a

strategic approach to HR management in higher education institutions, but the issue of methodological tools for the formation of the strategy itself has not been sufficiently considered. The purpose of the study was to identify effective conceptual frameworks and develop practical tools for the formation of the labour strategy of higher education institutions.

## ■ Materials and Methods

Three main methods were used to study the theoretical foundations and methodological tools for the formation of the personnel strategy of higher education institutions. A theoretical analysis of the foundations of the HR strategy of higher education institutions was carried out. Such aspects as strategic HRM in higher education institutions, the concept of competencies, which should be considered a key element of the HR strategy, and the impact of external factors on it were analysed. In addition, the article examined how modern HRM theories focus on the development of not only professional but also social competencies of employees, which contribute to teamwork and adaptation to change. The analysis also identified the main challenges.

Another important method was comparative analysis, which helped to compare different models of HR strategies (models with a focus on professional training, with a focus on innovation and research, with a focus on equality and support, with a focus on international cooperation, with a focus on technology and innovation) in higher education institutions in different countries, including Germany, the USA, Finland, the UK, and Japan (Baethge & Wolter, 2015; Easa & El Orra, 2021; Jotaba *et al.*, 2022). These countries were selected due to their unique approaches to higher education governance. This allowed to identify common features and peculiarities of the development of HR systems, which contributed to the identification of the most effective practices. Comparing the strategies of different institutions made it possible to assess their impact on the development of educational institutions.

The last research method was a survey conducted among managers and specialists of HR departments of higher education institutions. The questions were as follows: "What are the main goals of your higher education institution's HR strategy for the current year?"; "What problems do you face the most in implementing the HR strategy (lack of resources, lack of qualified staff, resistance to change)?"; "In your opinion, how effectively does the HR strategy contribute to the development of the professional potential of teachers and staff?"; "What recommendations could you make to improve the HR strategy at your higher education institution?"

This method allowed to collect empirical data on the current state of HR strategy in educational institutions, as well as to identify the problems faced by professionals in its implementation. The data obtained were analysed to identify the key factors that influence

the success of the HR strategy and were used to develop recommendations for its improvement. The study was conducted in accordance with the American Sociological Association's Code of Ethics (1997). The survey was performed among specialists of HR departments of higher education institutions in Ukraine. A total of 150 people took part in the study. The respondents were 60% women and 40% men. The age distribution of respondents was as follows: 26% were under 30, 44% were aged 31-45, and 30% were over 45. This distribution allowed to obtain a variety of perspectives and assessments of HR strategies in higher education institutions.

## ■ Results

The development of a HR strategy for higher education institutions is one of the key areas that ensures the effective functioning and development of these institutions. In the context of globalisation, technological progress and constant changes in the labour market, the importance of developing an effective HR strategy is growing significantly. The theoretical foundations and methodological tools of this process are multifaceted and include numerous approaches based on modern concepts of HRM, strategic planning and innovative methods of personnel development. Theoretically, the formation of HR strategy in higher education institutions is based on the principles of strategic HRM, which involves the use of an integrated approach to planning, selection, training, and development of personnel. One of the fundamental elements of this approach is the recognition that HR are the most important asset of an organisation and that investment in their development is of strategic importance for achieving long-term goals. The HR strategy should be integrated into the overall development strategy of the higher education institution. This means that approaches to the formation and management of personnel should be consistent with the mission, vision and strategic goals of the university or other educational institution. For example, if the institution's strategy is focused on innovation and research, the HR strategy should include the recruitment and development of academic staff with the appropriate competencies and abilities.

Modern HRM theories also focus on the development of staff competencies. The concept of competencies is one of the key ones in the formation of a personnel strategy. It implies that an employees' effectiveness is determined not only by their professional knowledge, but also by such qualities as communication skills, teamwork, ability to learn and adapt to new conditions. Therefore, the HR strategy should take into account not only the formal qualifications of employees, but also the development of their competences through various forms of professional development. The development of a HR strategy requires consideration of the external environment. Higher education institutions operate in a complex and dynamic environment, where

demographic changes, labour market changes, technological progress and global trends are important. These factors require educational institutions to be flexible in their approaches to HR management. In particular, the HR strategy should consider demographic trends, such as an ageing population and increased competition for talent, which is especially relevant for academic institutions. Methodological tools for developing a HR strategy for higher education institutions are a necessary element to ensure its effective implementation. This toolkit includes several key components, such as strategic workforce planning, staff selection and evaluation methods, professional development, and monitoring the effectiveness of the HR strategy.

Strategic HR planning is one of the most important stages in the development of an HR strategy. It involves forecasting staffing needs for the long term, considering the strategic goals of the higher education institution. For this purpose, various methods of analysis are used, such as SWOT analysis, which allows identifying the strengths and weaknesses of the institution in the context of HR management, as well as opportunities and threats from the external environment. Based on this analysis, the main directions of development of the HR strategy are determined, in particular, the need to attract new employees, improve the qualifications of existing staff or restructure the staff. Modern approaches to recruitment in higher education institutions involve the use of tools that allow assessing not only the professional knowledge and skills of candidates, but also their competencies, motivation, and learning ability. For this purpose, various assessment methods are used, such as interviews, testing, case studies or simulation exercises. The selection of academic staff is particularly important, as they ensure the quality of the educational process and research activities. In the environment of rapid technological development and changes in the labour market, continuous training and professional development are becoming a prerequisite for maintaining the competitiveness of both employees and higher education institutions in general. Professional development can be carried out through various forms, such as advanced training courses, participation in scientific conferences, exchange of experience with other educational institutions, internships, etc. Internal staff development programmes play a special role, as they allow for the integration of professional development into the daily activities of employees. Monitoring and evaluation of the effectiveness of the HR strategy is necessary at the final stage of its formation. This stage involves continuously tracking the effectiveness of the implemented HR strategies and adjusting them if necessary. Monitoring may include indicators such as employee satisfaction, productivity, number of scientific publications, participation in international projects, etc. Performance evaluation helps identify weaknesses in the HR strategy and make the necessary changes to improve it.

Despite the considerable theoretical and methodological potential, the development of an HR strategy in higher education institutions faces a number of challenges. One of them is the need to adapt to rapid changes in the labour market and education. For example, the development of technology requires educational institutions to attract specialists with new competencies, which requires changes in approaches to recruitment and development. In addition, demographic changes, such as an ageing population and increased competition for talented professionals, also pose additional challenges for HR strategies. Traditional approaches to HR management may not be effective enough in the face of rapid change, so higher education institutions must actively implement innovative HR management methods, such as digitalising selection processes, using big data to predict staffing needs, and applying artificial intelligence to assess candidates' competencies. Despite these challenges, the prospects for the development of HR strategy in higher education institutions are quite positive. Trends in the education sector indicate an increase in attention to HR policy and HR management, and the integration of the latest technologies, the development of international cooperation, and an emphasis on professional development are important.

Traditional recruitment methods based on curriculum vitae (CV) analysis and standardised interviews are not always effective in the modern education system, which requires innovative and integrative approaches to teaching. More flexible recruitment methods should be used, such as assessing employees' competencies through simulations or test tasks, which would allow for the evaluation of their professional qualities and skills in specific situations. It is also necessary to pay attention to the development of a progressive HR policy that will focus not only on retaining current staff but also on the development of young professionals. Therefore, it is important to create favourable conditions for attracting young professionals to work in higher education institutions. All criteria should include not only academic achievements, but also activity in research, participation in international projects, implementation of innovative methods in the educational process, and other aspects that contribute to the development of the educational institution.

Regarding the system of motivation and incentives for employees, it was found that an effective HR strategy should include a variety of motivational mechanisms to maintain high motivation among teachers and researchers. This may include both tangible incentives (bonuses, additional payments for scientific achievements or pedagogical innovations) and intangible forms of encouragement, such as public recognition of achievements, opportunities for professional growth through participation in international conferences, exchanges, or projects. In addition, the implementation of

individual development trajectories for each employee is a priority. Each teacher or researcher has their own unique professional ambitions and needs, which should be considered when planning their professional path. To this end, it is necessary to develop individual development plans that take into account not only short-term goals (e.g., participation in specific projects or advanced training), but also long-term development prospects (e.g., preparation for management positions or academic titles). Modern higher education institutions should be integrated into the global research and education space, including active participation in international exchange programmes, joint research and other forms of cooperation. This will not only improve the qualifications of staff, but also enhance the reputation of the institution internationally. Inviting foreign experts to lecture or conduct research, as well as the participation of Ukrainian teachers and researchers in international projects, will allow for the exchange of

experience and the introduction of best international practices into the educational process.

There is a need to update approaches to recruitment, create favourable conditions for attracting young professionals and ensure continuous professional development of employees. It is important to introduce a competency-based approach, digital technologies for HR management and flexible forms of employment. Therefore, the HR strategy should be comprehensive and consider both the needs of the higher education institution and the individual needs of its employees. It is important to ensure effective communication between the administration and staff, create favourable conditions for professional growth, and actively introduce innovations in management processes. This is the only way to ensure the long-term development of an educational institution. It is important to consider this issue comprehensively, so an international comparative analysis of HR strategies was carried out (Table 1).

**Table 1.** Comparative analysis of HR strategies in higher education institutions in different countries

Country	HR strategy model	Features and efficiency
Germany	A model with an emphasis on professional training	Germany uses a system that emphasises the integration of theoretical learning with practical experience. Higher education institutions actively cooperate with industry to provide internships and practical training. This allows students to acquire real skills that are needed in the labour market. The effectiveness of this model lies in the preparation of highly qualified specialists who are ready to quickly integrate into the professional environment.
USA	A model with an emphasis on innovation and research	In the United States, higher education institutions typically have a strong emphasis on research and innovation. They place great emphasis on attracting highly qualified professors who are actively engaged in research and publish in leading academic journals. Strategies often include competitive salaries and investment in infrastructure that supports research. This ensures high-quality scientific output and the development of new technologies.
Finland	A model with a focus on equality and support	The Finnish model of personnel strategy is characterised by a high level of equality between teachers and students. Particular attention is paid to the development of teachers' pedagogical skills and the provision of support for their professional growth. Important aspects are mentoring systems and regular professional development. The effectiveness of this model is manifested in the creation of a positive learning atmosphere and the maintenance of high standards of education.
Great Britain	A model with an emphasis on international cooperation	In the UK, the emphasis is on integrating international practices into HR strategies. Institutions actively collaborate with universities around the world, which allows them to introduce the latest teaching and research methods. Models include exchange programs for students and teachers, as well as joint scientific projects. This raises the academic level and ensures high quality education.
Japan	A model with an emphasis on technology and innovation	Japan is actively using the latest technologies for personnel management and training. For example, sensors for tracking students' physical activity or software for monitoring academic achievements. This approach allows creating individual development plans for each student, which contributes to a more accurate and effective learning process. This model allows integrating the latest technologies into education, improving its quality.

**Source:** compiled by the authors based on M. Baethge & A. Wolter (2015), N.F. Easa & H. El Orra (2021), M.N. Jotaba et al. (2022)

A comparative analysis of HR strategies in higher education institutions in different countries has revealed both common features and unique characteristics of each model. The common features include an emphasis on integrating the educational process with the real requirements of the labour market and introducing innovations into the educational process. Each country has its own peculiarities, which are reflected in the methods of forming and managing HR. Germany demonstrates the effectiveness of a model that focuses on combining theoretical learning with practical experience, which allows graduates to adapt to labour market requirements more quickly. This is achieved through

close cooperation with industry, which provides students with real-world practical skills. The United States is focused on supporting innovation and research, which attracts highly qualified professionals. This contributes to the high quality of scientific achievements and technological innovations, thanks to competitive working conditions and investments in research infrastructure. Finland stands out for its attention to equality and support for teacher development. This creates a positive learning environment and ensures high quality standards through mentoring and professional development systems. The United Kingdom focuses on international cooperation, which allows for the integration

of best practices from other countries and ensures high quality education through international exchanges and joint projects. Japan actively uses technology to monitor and support the learning process, which ensures an individual approach to each student and contributes to an effective learning process.

In line with the above information, the comparative analysis has shown that each country adapts its

HR strategy to meet its specific needs and context, but common trends include the integration of practical skills, support for innovation and international cooperation. This allows higher education institutions to increase their efficiency and competitiveness on the global stage. In order to implement effective solutions and strategies, it is necessary to identify the HR challenges, as shown in Table 2.

**Table 2.** Distribution of answers to questions about the main problems in HR strategies

Problems	Number of participants	Percentage, %
Insufficient communication	105	70
Lack of professional development	84	56
Motivation problems	90	60
Adaptation to changing conditions	78	52
Other problems	30	20

**Note:** the respondents could choose several answers

**Source:** compiled by the authors

Table 2 shows the distribution of respondents' answers to the question about the main problems in HR strategies. The largest number of respondents indicated insufficient communication as a key problem, which indicates the need to improve interaction between management and employees. The second most important issue is the lack of professional development, which indicates the need to update professional development

programmes. More than half of the respondents noted problems with motivation, which indicates the need to improve the motivation system. Adapting to changing conditions was a problem for half of the respondents, which shows the need for flexible HR strategies. Other problems were mentioned by a few respondents who could point to less significant but still important issues, as shown in Table 3.

**Table 3.** Assessment of the effectiveness of existing HR strategies

Indicators	Number of participants	Percentage, %
Very effective	30	20
Effective	54	36
Neutral	42	28
Ineffective	21	14
Very ineffective	3	2
Total	150	100

**Source:** compiled by the authors

The data in Table 3 shows the assessment of the effectiveness of existing HR strategies. In particular, a small proportion of respondents consider the existing strategies to be very effective, which may indicate overall positive assessments, but not unconditional satisfaction. The majority of respondents assessed the strategies as effective, but with some comments. A third of the participants took a neutral position, which may indicate the absence of significant changes or improvements. A small proportion of respondents (20 people) consider the strategies ineffective, which indicates that there are serious problems. Only 5 people considered them very ineffective, which may be a sign of a critical attitude towards HR strategies in certain institutions.

The study aimed at improving the HR strategy of higher education institutions reveals several important components and recommendations that should

be used in the process of HRM. One of the main aspects that the study focused on was the professional development of staff. This includes training, advanced training and the adoption of new technologies, which is critical to keeping employees' knowledge and skills up-to-date in the changing environment of the modern world. The study showed that investing in the development of professional competences is one of the most effective ways to increase the competitiveness of educational institutions, as well as to promote employee motivation and satisfaction. In addition, new information systems and platforms need to be introduced to improve communication between different levels of management. This includes the creation of integrated information exchange systems that ensure transparency and efficiency of communication processes. It is critical to introduce innovative forms of

training, such as online courses that can be accessed by all employees.

To improve adaptation to changing conditions, it is necessary to develop flexible strategies that allow for a quick response to external challenges. This may include implementing systems to monitor changes in the external environment and regularly reviewing HR strategies. It is important to invest in the latest technologies to automate and improve HRM processes. This may include the introduction of digital platforms for monitoring and managing HR, which ensures efficiency and transparency of processes. The study identified additional factors, namely that for the effective implementation of professional development programmes, it is necessary to use a variety of training methods. This allows taking into account individual characteristics of employees, their needs, and level of training. Among these methods, a special place is occupied by trainings that allow deepening knowledge and skills in specific professional areas. Trainings are usually conducted under the guidance of experts or trainers who have extensive experience in the relevant field. They can be short-term or long-term, depending on the purpose and content of the programme. The study recommended increasing the frequency of trainings and ensuring that they meet current market needs. Seminars are another important component of professional development.

They provide an opportunity for employees to share experiences and learn about the latest developments in their field. Seminars allow teams to broaden their horizons, raise awareness of modern working methods and receive practical advice on how to apply new technologies and techniques. The study found that seminars are an effective tool for maintaining employees' professional engagement and help to generate new ideas and approaches to performing their duties. Refresher courses play a key role in ensuring the continuous development of employees. They help to deepen professional knowledge and acquire new skills that are becoming essential. Courses can be either internal or external. Internal courses are usually organised by the institution itself, which allows them to be tailored to the needs of a particular institution. External courses, which can be provided by third-party organisations or training centres, provide an opportunity to gain a wider range of knowledge and skills. The study showed that one of the key factors in the success of advanced training courses is their systematic nature and integration into the overall HR strategy.

The study paid special attention to online learning, which has become an integral part of modern professional development programmes. Online learning allows employees to acquire new knowledge and skills at a time convenient for them, without the need to leave their main job. This is especially important in the context of the COVID-19 pandemic, when many institutions were forced to transfer a significant part of their

curricula to an online format. The study recommended the introduction of more online courses and distance learning platforms that can be effectively used to up-skill employees. The recommendations include the introduction of regular training needs assessment programmes, which will allow institutions to identify gaps in employees' knowledge and skills in a timely manner and provide them with the necessary resources for professional development. In addition, it was suggested that a system of individual professional development plans for each employee should be introduced, which would allow for a more precise matching of the needs and goals of each individual employee and the organisation as a whole.

The most important aspect was to improve the system for monitoring the effectiveness of professional development programmes. Systematic evaluations of the effectiveness of training should be introduced to help higher education institutions adjust their programmes to the actual needs and outcomes of their employees. This can include both quantitative and qualitative evaluation methods, such as participant surveys, analysis of their achievements, and feedback from supervisors. The study showed that professional development is an integral part of an effective HR strategy for higher education institutions. The introduction of modern teaching methods, such as trainings, seminars, refresher courses and online learning, will help to improve the efficiency of employees and ensure the development of HR. The recommendations developed on the basis of the findings are aimed at creating a system that will allow employees to continuously improve their knowledge and skills and higher education institutions to remain competitive in the current environment.

## ■ Discussion

The results showed that HR strategy in higher education is becoming a key tool for ensuring the quality of the educational process and achieving strategic goals. It covers the planning, selection, development, and retention of teaching and administrative staff that contributes to the fulfilment of the institution's mission. The HR strategy includes several key components: workforce planning, recruitment of qualified professionals, continuous professional development, and motivation and retention. These measures not only improve the quality of education, but also help institutions to innovate and compete in the education market. Despite its importance, the implementation of HR strategies can be hampered by financial constraints and limited resources, which creates challenges for ensuring adequate staff support and institutional development. Many researchers, such as A. Parnell (2021), O.V. Zakharova & L.M. Usyk (2023) and B. Abbasnejad *et al.* (2024), have noted that the HR strategy in higher education should include long-term goals aimed at ensuring the sustainability of the staff and the development of professional

competencies. The study conducted in this paper has confirmed the need for a systematic approach to HRM, as well as the importance of introducing innovative methods of training and development of staff, which is consistent with the views of the above researchers. A. Jonnergard *et al.* (2024) and M. Verkuyl *et al.* (2024) emphasised the importance of a long-term HR policy, where strategic planning plays a key role. These results confirm this position, as a stable HR policy allows educational institutions to maintain a high level of teaching staff and promote their continuous development. Furthermore, the integration of continuing education concepts for teachers, which is a key element of a modern HR strategy, is confirmed as necessary for success.

M. Plachkinova *et al.* (2022) highlighted a competency model based on the development of key professional qualities of employees. These researchers noted that such a model implies a focus on the development of specific competencies that meet the needs of the labour market and the internal needs of the institution. The present study concluded that the competency model is the most appropriate in the current environment, as it allows maintaining a high level of compliance between the requirements for staff and their professional qualities. This confirms the importance of regular updating of professional standards and continuous training of teachers. In addition, the competence model allows institutions to effectively adapt to changes in the labour market, which is especially important in the context of the digital transformation of education. This approach is in line with the findings of G.P. Gasca-Hurtado & L. Machuca-Villegas (2024), who noted that the HR strategy should be flexible and focused on the development of innovative teaching and management methods. Nevertheless, there is a completely different approach proposed by J. Speer *et al.* (2022), based on a mentoring system, although it has its advantages. In this study, it did not show such high efficiency. Supporting young teachers with experienced colleagues is important, but it is not enough for the effective development of the entire HR system, as additional resources are needed to support continuous skills' development.

Another important aspect is the application of modern methods of HR management in higher education. The use of tools such as coaching, mentoring, and the development of emotional intelligence among teachers plays a key role in improving the quality of the educational process. In their research, D. Martins (2022) and A. Juhaidi (2024) stated that effective HRM through the development of teachers' communication and soft skills improves the interaction between teachers and students, which in turn has a positive impact on learning outcomes. The present study found that coaching and emotional intelligence are effective tools for increasing teachers' motivation and professional satisfaction. This confirms the need to introduce emotional learning methods to develop teachers' self-regulation

and effective communication skills, which is consistent with the findings of D.C. Sudan & V.G. Zuin (2022) and S. Amponsah *et al.* (2024). Moreover, this study found that the use of coaching methods increases the level of teachers' autonomy and promotes their professional development.

The results of the study showed that digital transformation is another important factor influencing the HR strategy of higher education institutions. Studies such as those by B.O. Bejarano Lizano *et al.* (2023) showed the need to introduce digital tools into the HRM system to automate the recruitment and development processes. The findings of this study confirm this opinion. The introduction of digital technologies can significantly reduce the time spent on administrative processes and increase the efficiency of HR work. It is important to note that automation and digital tools cannot completely replace the human factor. This is in line with the findings of T.O. Olusola-Fadumiye *et al.* (2022) and S. Biswas *et al.* (2022), who emphasised that digitalisation should only be a supporting tool, not the main element of the HR strategy. This study found that effective HR management involves combining digital technologies with traditional methods, such as an individual approach to each employee.

The high quality of the HR strategy directly affects the effectiveness of the educational process. The study by T.-M. Ly-Le *et al.* (2024) showed that higher education institutions that have a developed system of motivation and support for teachers demonstrate better indicators of education quality. This study also found that institutions that actively invest in the development of their staff achieve higher results in the learning process. In line with this, the study confirmed the relationship between the quality of the HR strategy and educational outcomes. In particular, support for the professional development of teachers through advanced training courses, international exchange programmes and participation in research contributes to their motivation and engagement in the educational process. These findings are in line with Z. Horvath *et al.* (2024), who pointed out the need for continuous staff development to achieve high quality education.

The results of this study confirmed the consistency with modern theoretical approaches to the formation of HR strategy in higher education institutions. It was found that the HR strategy should be based on long-term planning, competence development and a flexible approach to changes in the labour market. The use of modern management methods, such as coaching and the development of emotional intelligence, plays a crucial role in improving the efficiency of teaching staff and the quality of the educational process. Digitalisation is also an important tool to automate HR processes, but it cannot replace the human factor. Digital technologies should be used to increase the efficiency of administrative work and support professional development, but

the most important element of a successful HR strategy is an individual approach to each employee.

In summary, these findings are consistent with the results of studies by other researchers, such as M.P. Johnston-Guerrero & C.L. Wijeyesinghe (2021), D.U. Gede & A.T. Huluka (2023) and S. Liu *et al.* (2024), who emphasised the importance of strategic planning, development of professional competencies, integration of innovative HRM methods, and use of digital technologies. The implementation of these approaches in the practice of higher education institutions allows increasing motivation, employee satisfaction, and the quality of educational services, which is the key to successful operation in the context of global competition and rapid changes in the labour market.

## ■ Conclusions

The results of this study demonstrated the importance of a systematic approach to the formation of a HR strategy for higher education institutions, taking into account constant changes in the educational environment, technological development and labour market requirements. The study showed that a clear definition of the goals of the HR strategy is critical for its successful implementation. Higher education institutions should formulate their goals in the light of changes in the external environment, such as technological innovation, globalisation, and changes in professional competence requirements. Such goals should be integrated with the overall development strategies of the institutions and meet the needs of the educational process and research activities. The importance of involving the heads of educational institutions in the development of HR strategies to achieve the relationship between the HR strategy and the overall goals of the institution is determined.

Adapting HR strategies to a changing environment is a prerequisite for their effectiveness. In educational environment, the key success factor is the ability of higher education institutions to respond quickly to changes in the external environment, especially given the intensive development of information technology and new challenges associated with changes in the labour market. The comparative analysis of HR strategies at the international level conducted in the course of the study has shown that countries where higher education institutions actively implement technological solutions

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in HR management demonstrate higher efficiency of their institutions. It is important to introduce modern management methods that involve the use of information and communication technologies to improve the quality of HR management.

The integration of modern management methods into the HR strategies of higher education institutions is essential for their long-term effectiveness. The results of the survey of HR staff indicated that most higher education institutions need new tools to improve the skills of their staff and adapt to new educational technologies and student needs. Such tools include e-learning systems for staff development, as well as platforms for monitoring and evaluating the performance of teachers. It is also recommended to introduce feedback mechanisms that will help in decision-making to improve HR strategies based on the actual needs of employees. The study also highlighted the need to improve existing approaches to HRM in higher education institutions. One of the important aspects is the systematic development of staff competencies, which will contribute to the overall efficiency of the educational process and research activities. Given the rapid changes in the requirements for educational activities, educational institutions should implement systems of continuous professional development that will ensure that the knowledge and skills of employees are updated.

Among the recommendations for developing and improving HR strategies, the key is the need to develop comprehensive staff development plans that include regular trainings and seminars for teachers and administrative staff. It is also important to introduce mechanisms for monitoring the effectiveness of HR strategies, which will allow adjusting these strategies in line with new challenges and needs of the institution. Systematic monitoring will allow not only to evaluate the effectiveness of the strategy, but also to promptly implement changes to improve its results. Prospects for further research are to increase the sample and study the impact of digital technologies on the formation of HR strategies in higher education institutions.

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## ■ Conflict of Interest

None.

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## Теоретичні основи та методичний інструментарій формування кадрової стратегії закладів вищої освіти

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■ **Анотація.** Метою даного дослідження було виявлення складових освітнього менеджменту, його управління та безпечних умов праці для викладацького складу в університетах. Методологія включала три основні методи: теоретичний аналіз, порівняльний аналіз і анкетування. Отримані результати допомогли виявити ключові проблеми та найкращі практики у формуванні кадрових стратегій, порівняльний аналіз дозволив порівняти різні моделі стратегій на міжнародному рівні, а анкетування серед працівників кадрових підрозділів дало змогу зібрати конкретні дані про актуальні проблеми і потреби. Основні результати дослідження показали, що ефективні кадрові стратегії включають чітке визначення цілей, адаптацію до змінюваного середовища та інтеграцію сучасних методів управління. Результати виявили необхідність удосконалення існуючих підходів через впровадження нових інструментів та методик, що відповідають сучасним вимогам освітнього середовища. Дослідження надало практичні рекомендації для вдосконалення кадрових стратегій, що можуть сприяти підвищенню ефективності управління людськими ресурсами в закладах вищої освіти. Аналіз результатів показав, що впровадження інтегрованих підходів до кадрової стратегії, таких як розвиток компетенцій та використання сучасних технологій, суттєво покращує ефективність управління. Зокрема, виявилось, що заклади вищої освіти потребують систематичного підходу до підвищення кваліфікації персоналу і адаптації до нових викликів. Дане дослідження дало змогу розробити комплексні плани розвитку персоналу та впровадження механізмів моніторингу і оцінки кадрових стратегій, що дозволять забезпечити їхню відповідність стратегічним цілям освітніх установ

■ **Ключові слова:** управління персоналом; складові управління; концептуальні засади; безпечні умови праці; професійна адаптація



## Digital transformation in human resource management within the vocational education system

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■ **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

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## ■ 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 21<sup>st</sup> 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.

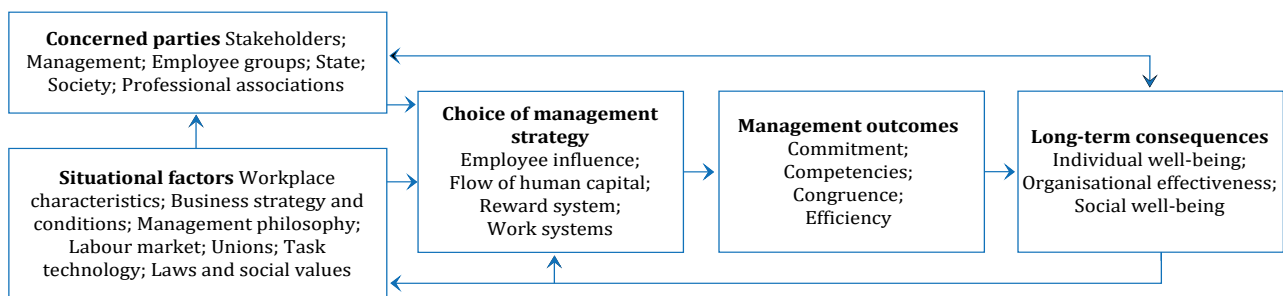
## ■ Materials and Methods

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
<ul style="list-style-type: none"> <li>■ Proven effectiveness of digital tools for human resource management</li> <li>■ Variety of digital human resource management tools</li> <li>■ Willingness of employees to use digital tools</li> </ul>	<ul style="list-style-type: none"> <li>■ Outdated material and technical base</li> <li>■ Lack of motivation to use digital tools</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>■ Vocational education reform under the Ministry of Education and Science of Ukraine strategy</li> <li>■ International cooperation for vocational education reform</li> <li>■ Emergence of new digital human resource management tools</li> </ul>	<ul style="list-style-type: none"> <li>■ Destruction and closure of vocational education institutions</li> <li>■ Mass layoffs of personnel in vocational education institutions</li> <li>■ Rejection of the implementation of digital human resource management tools in vocational education institutions</li> </ul>

**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.

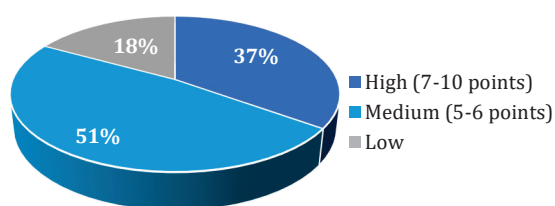
### Implementation of digital tools in vocational education

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 specialities 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. Mdhlalose & 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

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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.

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## ■ Conflict of Interest

None.

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## Цифрова трансформація в управлінні персоналом у системі професійної освіти

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■ **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



## Methodological aspects of using artificial intelligence in the preparation of future vocational education specialists

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■ **Abstract.** Artificial intelligence significantly influences the transformation of education, science, and society, marking a new stage in the development of technologies. Its active integration into the educational process enhances the level of interactivity and personalisation of learning. This article aimed to investigate the methodological foundations of applying artificial intelligence systems in vocational education and to experimentally test a pedagogical system for developing vocational education learners' readiness to use artificial intelligence. Theoretical evidence supported the need to improve the methodology for implementing artificial intelligence based programmes in vocational education and outlines the potential for using the proposed methodology to enhance the training of future vocational education specialists in the context of educational transformations. The concept of "artificial intelligence" was defined, with its main characteristics and features outlined. This study presented a methodology for the successful implementation of artificial intelligence systems in the preparation of specialists in the field of vocational education. It has been identified that the promising directions for improving the implementation of educational programmes aimed at training future specialists in vocational education through the use of artificial intelligence systems include specific recommendations on the methodology of their application during the teaching of the course "Fundamentals of Artificial Intelligence". In the context of implementing this methodology, it was recommended to use the following artificial intelligence services: SlideBot, Quizlet, DALL-E, Gemini, and ChatGPT in the teaching of the "Fundamentals of Artificial Intelligence" course within the implementation of educational and professional programmes in "Vocational education. Technology of light industry products (garments)" and "Vocational education. Transport (Car maintenance and repair)". A pedagogical system for developing vocational education learners' readiness to use artificial intelligence has been proposed, which includes the following stages: needs analysis and identification, development of methodological foundations, implementation and piloting, scaling and dissemination, monitoring and evaluation. The presented pedagogical system was based on three interrelated components of readiness formation: motivation-goal, cognitive-activity, and results evaluation. The effectiveness of the presented pedagogical system was assessed at three levels: high, medium, and low

■ **Keywords:** digital technologies; pedagogical system; educational transformations; readiness formation; interactive learning

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## ■ Introduction

Despite the challenging political and economic circumstances brought about by Russia's armed aggression and the COVID-19 pandemic, Ukraine continues to actively implement electronic government services. In 2021, the Cabinet of Ministers of Ukraine approved a strategic document outlining the directions for the development of artificial intelligence (AI) in the country until 2030. This document envisages the active use of AI technologies in education, the economy, public administration, and other areas to enhance Ukraine's competitiveness in the global market. The following year, the Ministry of Education and Science unveiled an ambitious "Education 4.0" program designed to modernise the education system in line with contemporary challenges and take into account Ukraine's recovery plan. This program is part of the national strategy for the development of AI (Institute of Artificial Intelligence Problems, 2021). Ukraine is making significant strides in AI research. Scientists from institutions such as the V.M. Glushkov Institute of Cybernetics, the Institute of Artificial Intelligence Problems, and Taras Shevchenko National University of Kyiv are actively developing new AI algorithms, models, and applications. Their research spans a wide range of areas and has already yielded several important results with significant potential for the advancement of Ukrainian science and economy (Baranovsky *et al.*, 2022; Awasthi & Soni, 2023).

According to V. Bykov *et al.* (2020), Education 4.0 is a new paradigm in education designed to prepare individuals for life and work in the digital age. It is based on the principles of flexibility, individualisation, collaboration, and lifelong learning. One of the key components of Education 4.0 is the use of AI. AI systems can analyse data on each individual learner to create personalised learning plans. They can also automate numerous tasks typically performed by teachers, such as assessment, lesson planning, and administration. AI programs have the potential to make education more accessible to students worldwide; they can be used to create simulations and virtual environments that allow students to practice their skills in a safe and realistic setting, and they can make learning more engaging and exciting for students through the use of games, quizzes, and other interactive elements. C. Chaka (2023) demonstrated that the use of AI in vocational education can automate numerous educational processes, opening up new avenues for learners and easing the workload of educators. To compensate for the time constraints of the Education 4.0 era, where the world's information base is updated rapidly every day, educators need to utilise AI programs to make learning more diverse and engaging. This can be achieved by creating creative tasks of varying difficulty. AI is capable of generating various task options. AI allowed to experiment with different question formats and teaching methods, taking into account the diverse abilities and perspectives of students. It is

important to note that many experts believe that the presence of a teacher in the classroom remains essential. AI can only complement and facilitate the work of educators, but not replace them entirely.

The world of work is changing due to technological advancements, and vocational education must keep pace with these changes. In numerous scholarly studies, C.S. González-González *et al.* (2021) argued that AI offers numerous opportunities to improve vocational education and prepare future professionals in this field to meet the demands of the modern job market. The researchers had identified key arguments in favour of using AI in vocational education: personalised learning, improved practical skills, increased accessibility of education, preparation for working with AI, and enhanced teacher efficiency. It has been shown that the use of AI in vocational education also presents certain challenges, such as potential biases in AI systems, the need to ensure cybersecurity and data privacy, and ethical considerations regarding the use of AI in education. However, the benefits of using AI in vocational education significantly outweigh the risks. AI has the potential to revolutionise vocational education, making it more personalised, accessible, efficient, and relevant to the needs of the modern job market. It is important to note that AI should not replace teachers but complement their work. Teachers play a crucial role in ensuring that students receive a high-quality vocational education based on the use of digital educational resources. This research aimed to examine the methodological underpinnings of using AI systems in vocational education, as well as to empirically validate a pedagogical framework for increasing vocational education learners' preparedness to utilise AI.

## ■ Materials and Methods

As part of the experimental research, the methodological foundations for the application of AI systems in vocational education were determined. This allowed for the theoretical justification and experimental testing of the pedagogical system for developing vocational education learners' readiness to use AI. The system included the identification of the methodological foundation for forming the readiness of future professionals in vocational education and the delineation of the components of vocational education learners' readiness to use AI, namely: motivation-goal, cognitive-activity, and results-evaluation. Additionally, within the framework of the research, methods were selected to assess the development level of the components of vocational education learners' readiness at both the diagnostic and formative stages of the experiment.

The study was conducted during the 2023-2024 academic years at Khmelnytskyi National University, Khmelnytskyi, Ukraine. The sample consisted of 42 respondents studying at the Faculty of Humanities

and Pedagogy, Department of Technological and Vocational Education and Decorative Arts, under the Educational-Professional Programs “Vocational education. Technology of light industry products (garments)” and “Vocational education. Transport (Car maintenance and repair)”. The control group included 20 higher education students, and the experimental group consisted of 22 participants. To address the motivational component of readiness, it is recommended to implement project-based learning (involving students in creating their own projects where they can apply their knowledge in practice), group work (facilitating collaboration and mutual support among students), competitions (organising academic competitions to boost motivation), and mentorship (pairing students with more experienced peers or faculty). To address the content-technological component of readiness, a course titled “Fundamentals of AI” was introduced into the curriculum for vocational education programs such as “Vocational education. Technology of light industry products (garments)” and “Vocational education. Transport (Car maintenance and repair)”.

The aim of the course “Fundamentals of AI” was to develop students’ systematic knowledge of the principles of designing and developing intelligent systems capable of learning, reasoning, and decision-making under conditions of incomplete information. Throughout the course, students were introduced to classical AI methods, modern approaches to knowledge representation and machine learning, as well as current issues and prospects for the development of the field. The implementation of the criterion-evaluation component was carried out by developing an assessment scale that took into account students’ theoretical knowledge and practical skills in using AI systems, alongside conducting regular reports to assess the effectiveness of task completion.

To assess students’ theoretical knowledge and practical skills in using AI systems, a four-point grading scale was developed based on the criterion-evaluation component: depth of theoretical knowledge, ability to apply knowledge in practice, creativity, ability for independent learning, and adherence to ethical standards. Monthly presentations were conducted, where students presented the results of their work. Assessments were carried out using rubrics that considered the alignment of the completed work with the set tasks, the quality of presentation, originality of approach, and adherence to deadlines. At the diagnostic stage of the experiment, an anonymous survey was conducted among respondents in both the control and experimental groups. The questionnaire consisted of eight questions related to the use of AI in the educational process. The questionnaire included the following questions: Are you familiar with the AI programs SlideBot, Quizlet, DALL-E, Gemini, and ChatGPT? Do you use ChatGPT for completing academic tasks? Does the use of AI programs contribute to plagiarism in assignments? What is the role of AI systems in

vocational education? Is there a need for universities to develop rules for using AI in the educational process? The questionnaire was conducted in accordance with The guidance note of the European Commission on ethics and data protection (2021). After implementing the pedagogical system, a repeated assessment of the respondents in the control and experimental groups who were taught using the experimental methodology was carried out.

## ■ Results

### **Rationale for the methodological aspects of using AI in vocational education**

Within the scope of this research, “AI” was understood as a powerful field of computer science with significant potential, aiming to create intelligent agents capable of reasoning, learning, and acting autonomously. AI systems can process large amounts of data, identify patterns, make predictions, and make decisions, similar to how humans do (Velykanova *et al.*, 2022). The rapid advancement of AI demonstrates its immense potential. AI is increasingly being used for data analysis, automation of routine tasks, and the development of innovative solutions, showcasing significant potential. Its advantages, such as replacing humans in mundane tasks, increasing productivity, and enabling effective decision-making, are becoming increasingly evident. AI algorithms can process vast amounts of data that are beyond human comprehension (Pisica *et al.*, 2023; Kovachov & Suchikova, 2023).

Vocational education in Ukraine is increasingly facing the challenge of ensuring uninterrupted learning in the face of an unstable electricity supply. The use of AI and cloud technologies can be an effective solution. They allow for diversifying learning through the creation of interactive materials and personalising the educational process, improving access to knowledge by enabling students to independently study complex topics using AI tools, and increasing learning efficiency by automating routine tasks (Marienko *et al.*, 2022; Cherkhatova, 2023). AI undoubtedly impacts the pace, forms, and outcomes of scientific progress in the field of vocational education. Through AI programs, it is possible to automate routine tasks such as data collection, cleaning, and analysis, freeing up time for creative and analytical work; to identify hidden patterns and relationships in data that humans might miss; to minimise human error and bias, making research more reliable; and to integrate data from various sources, stimulating collaboration among researchers from different fields. The implementation of AI in vocational education is associated with several challenges, namely: the risk of a digital divide and the need to adapt to new working conditions. To successfully implement AI in vocational education, it is necessary to provide access to retraining programs for educators, develop research in the field of AI by stimulating scientific developments in Ukraine,

and create a favourable environment for innovation by involving businesses in cooperation with education.

In addition to the advantages, the use of AI programs also has drawbacks that cannot be ignored. Specifically, there is a risk of establishing total control over people and collecting vast amounts of personal data, which could lead to restrictions on personal freedom (Nguyen *et al.*, 2023). AI algorithms can be complex and opaque, making it difficult to understand how they make decisions. This can lead to distrust of research results and ethical issues related to bias and discrimination. By using AI, it is possible to automate many tasks previously performed by specialists. This can lead to job losses and a degradation of scientific skills. AI can be used to personalise learning, adapt educational programs to the needs of higher education students, and automate assessment. This can lead to the standardisation of education and a decrease in the role of teachers (Moroianu *et al.*, 2023).

Given the rapid pace of technological development, there is reason to believe that the active implementation of AI can overcome existing shortcomings in the future. Through a wise combination of AI, the human factor, government oversight, and a well-developed methodological system for using AI in vocational education, it will be possible to create an effective and safe professional training system in Ukrainian higher education institutions, based on digitalisation. The use of AI in vocational education must be conducted ethically and responsibly, taking into account all possible risks and benefits. Clear ethical principles and standards must be developed to govern its use in scientific research and educational activities. The use of AI in education has prompted mixed reviews in terms of academic integrity. On the one hand, there is a risk of plagiarism and other forms of misconduct, as AI programs can be used to generate text, translate languages, and complete assignments without a deep understanding of the material. On the other hand, AI can become a tool for better understanding and assessing students' knowledge, as well as for personalising learning.

It is important to note that the ethical and responsible use of AI programs is a key factor in maintaining academic integrity. Educators need to clearly outline rules and expectations regarding the use of AI in the educational process, as well as teach learners the ethical principles of working with this technology (Popenici & Kerr, 2017; Ungerer & Slade, 2022). AI systems and vocational education are becoming increasingly inseparable. Vocational learners are already actively using AI systems to search for information, complete assignments, and prepare for exams. Educators need to understand and use AI to improve the educational process, making it more dynamic, interactive, and personalised. AI can help educators: automate routine tasks such as grading assignments and assessing knowledge, create individualised learning plans for each vocational

learner, and provide them with access to additional learning resources and tools, as well as evaluate the effectiveness of learning and make necessary adjustments.

Neural networks are complex machine learning algorithms that can model the workings of the human brain. They are capable of learning from data and making predictions, making them a valuable tool for vocational education. In vocational education, neural networks can be used for: speech and visual pattern recognition, personalising learning and adapting it to the needs of each individual learner, automated assessment of knowledge and providing feedback, and creating interactive learning environments (Ouyang *et al.*, 2022). In Ukraine, AI systems in vocational education and academic integrity are emerging concepts that have been actively developing over the past decades (Glazunova & Shyshkina, 2018). Ukrainian society is still adapting to these new directions, so it is important to have a constructive dialogue about their ethical and legal aspects. AI has significant potential to transform education, making it more dynamic, interactive, and personalised. It is important to use AI ethically and responsibly. AI technologies offer a wide range of tools that can significantly simplify the work of teachers and make vocational education more effective. The following AI programs have been proposed for use in vocational education; SlideBot – an automatic presentation creation tool based on the inputted text. This tool saves time in preparation, allowing the educator to focus on teaching methodologies. SlideBot also suggests an optimal slide structure to enhance material comprehension for vocational education students. Quizlet – a tool for creating flashcards with questions and answers, automatically generating tests, interactive games, automatic answer checking, result analysis, and recommendations for further learning. Quizlet helps educators better understand the needs of vocational education students and offers a personalised approach to learning; DALL-E – a tool for creating images and videos based on textual descriptions. DALL-E allows for the visualisation of historical events, generates videos with audio descriptions, makes learning more engaging, and fosters deeper immersion for students in the material (Pankratova & Sholokhov, 2019; Sabzalieva & Valentini, 2023).

The integration of AI into vocational education can significantly enhance its efficiency and quality by reducing preparation time, automating routine tasks, saving resources, employing personalised learning approaches, adapting to the needs of each individual learner, differentiating tasks, increasing motivation and interest in the subject matter, enabling deeper immersion in the material, utilising interactive and engaging learning formats, collecting data on learning outcomes, identifying topics requiring further study, and monitoring the progress of vocational learners (Holzinger *et al.*, 2023). To effectively implement AI in vocational education, it is necessary to clearly define the priority areas of its

application. Analysing successful case studies will help to formulate recommendations for the development and implementation of new AI solutions that are most relevant to Ukrainian vocational education institutions. AI has significant potential to revolutionise scientific research and the educational process. However, it is important to be aware of the ethical dilemmas associated with its use and to take steps to address them. Only through an ethical and responsible approach can AI become a truly valuable tool for the development of vocational education.

### **Peculiarities of enhancing the methodological aspects of using AI in vocational education**

The integration of AI into vocational education presents new opportunities to enhance learning quality, personalise the educational process, and prepare professionals who meet the demands of the modern job market. However, the effective use of AI in this field requires a clear methodology that takes into account the specific characteristics of vocational education and the needs of its participants. During the experimental research, the main components of the methodology for using AI in vocational education were identified. The outlined methodology includes several key aspects. The analysis of needs and opportunities involved evaluating current processes, such as existing curricula, assessment methods, infrastructure, and resources, while identifying problem areas where AI can provide the greatest benefit, including personalising learning, automating routine tasks, and analysing large volumes of data. It also included evaluating technical readiness, focusing on the availability of necessary equipment, software, and infrastructure to support AI systems. The development of an implementation strategy focused on defining clear goals, such as improving the quality of learning, increasing student motivation, and optimising the work of educators. It also involved researching and selecting appropriate AI tools that meet the institution's needs and creating a detailed roadmap for implementation, including stages, timelines, responsible parties, and required resources. Teacher training plays a critical role. This included conducting workshops and seminars to familiarise educators with AI capabilities and providing skills to work with new technologies. It also redefined the teacher's role in the context of AI, emphasising creative and communication skills, and fosters a community of practitioners to facilitate experience sharing and mutual support. Building infrastructure ensured the availability of necessary equipment, such as computers, networks, and software, to support AI systems. Measures for data protection were implemented to ensure the security and confidentiality of student information, while AI systems were integrated with the institution's existing information systems. Phased implementation and evaluation involved starting with small projects and gradually expanding the areas of AI application.

Feedback was collected from students, teachers, and administrators regarding the effectiveness of the implemented tools, and regular monitoring and evaluation are conducted to assess outcomes and make necessary adjustments. Finally, continuous development was essential. This included keeping track of the latest advancements in AI, ensuring timely updates to tools in use, providing ongoing user support, and continuously improving curricula to incorporate new AI capabilities.

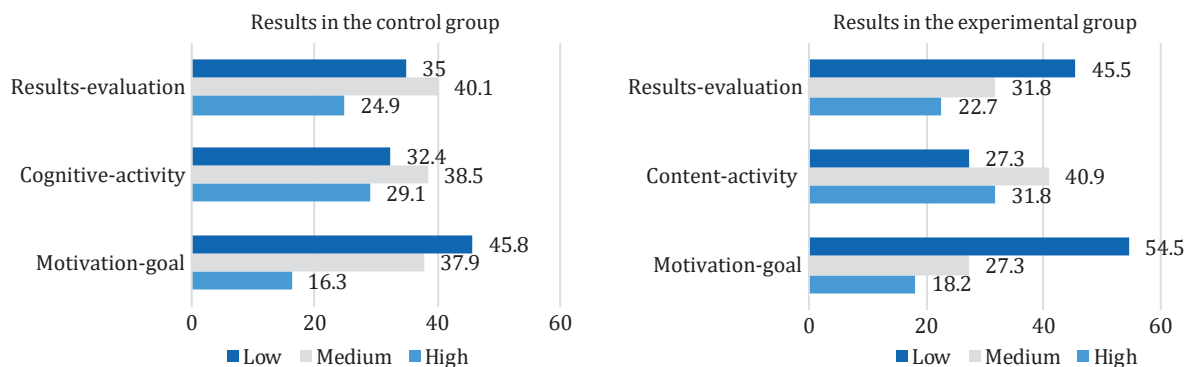
The key factors for the successful implementation of AI in vocational education include taking into account the specific characteristics of each educational institution and the needs of its students. Engaging all stakeholders in the implementation process (teachers, students, administration, and parents) is crucial. Phased implementation of AI should be adopted to avoid overwhelming the system. Regular evaluation of the implementation outcomes and making necessary adjustments is essential. Continuous support should be provided to users and educators. Considering the outlined research objectives, a survey was conducted during the initial phase of the experiment. The results revealed that 82% of respondents are familiar with AI programs such as SlideBot, Quizlet, DALL-E, Gemini, and ChatGPT. Of these, 43% have used ChatGPT to complete academic tasks, and 78% acknowledge that the use of AI systems may lead to plagiarism. Furthermore, 14% of respondents admitted to using AI systems to complete tasks and submit the results as their own work. 52% of respondents believe that AI systems can be beneficial in vocational education if used ethically, and 87% think that universities need to establish clear guidelines for the use of AI in the educational process. It can be concluded that, overall, vocational education students have a positive attitude towards the use of AI programs in education and actively utilise them. To assess the readiness of higher education students to utilise AI in vocational education, a pedagogical framework was developed during the baseline phase of the experiment. This framework was structured around three key components of readiness: motivation-goal, cognitive-activity, and result-evaluation.

The motivation-goal component of readiness involved the methodological foundation for using AI in vocational education. The aim of developing the pedagogical system was to enhance the methodological aspect of AI usage in vocational education, which included motivating students to incorporate AI into their professional activities. The following methodological approaches were used as the basis: systemic, student-centred, activity-based, conceptual, and multi-subject, along with the principles of teaching: clarity (using visual materials, such as images, diagrams, and tables, for better understanding and assimilation of information); natural correspondence; activity (stimulating active participation from vocational education students in the learning process, employing interactive teaching

methods and AI); systematisation and consistency (ensuring logical connections between topics and lessons, with a gradual increase in the complexity of the material); perspective and continuity (considering the future development of student's knowledge and skills, ensuring continuity between previous and subsequent learning material); and humanisation (creating an atmosphere of trust and cooperation, respecting students' opinions and feelings).

The cognitive-activity component of readiness focused on the methods and techniques of integrating AI into vocational education. This involved selecting appropriate AI software and determining how it could be effectively used in the learning process. To ensure

the effectiveness of this approach, student learning outcomes were regularly assessed, allowing for necessary adjustments to be made. The results-evaluation component of preparing vocational education learners for the digital transformation of education plays a crucial role as it allows for the assessment of the effectiveness of AI systems within the educational process. The findings from this component aid in adapting educational practices to contemporary demands and ensuring that vocational learners are adequately prepared for life in a digital society. Figure 1 presents the results of the assessment of vocational learners' readiness to use AI, as measured by the defined components at the baseline stage of the experiment.



**Figure 1.** Assessment results of vocational learners' readiness based on the defined components in the control and experimental groups at the diagnostic stage of the experiment, %

**Source:** created by the authors

Considering the results of the research, there is a need to develop clear guidelines for the use of AI in vocational education. These should include defining acceptable and unacceptable practices; conducting educational discussions with students on the ethical use of AI systems and academic integrity; equipping educators with the ability to offer students alternative methods and tools for completing tasks that do not require the use of AI; developing an updated methodology for the use of AI in vocational education; and conducting further research into the impact of AI on the educational process and academic integrity in vocational education.

The findings of the diagnostic stage of the experiment revealed that participants in both the control and experimental groups exhibited low to moderate levels of readiness to use AI systems in their professional work. This suggests a reluctance to embrace professional development in this area. The insufficient development of the cognitive-activity component of readiness further highlights the need for a revised pedagogical approach to AI integration in vocational education. Additionally, the motivation-goal component requires improvement. This is because it is crucial to understand the necessity of AI and to be able to assess the skills and knowledge in this field.

Therefore, it was necessary to conduct a formative stage of the experiment. This stage aimed to integrate

a pedagogical system designed to prepare students for using AI in their future professions. The control group followed traditional teaching methods, while the experimental group was taught using a new approach that incorporated digital educational resources powered by AI. The proposed pedagogical system includes the following stages. Analysis and identification of needs (conducting a comprehensive study of the needs and expectations of stakeholders in vocational education, including educators, students, employers, and government bodies; identifying key competencies and skills to be developed in students as part of their professional training; analysing the available resources and infrastructure for implementing AI in vocational education). Development of methodological foundations (determining the methodological approaches and principles for using AI in vocational education, considering ethical standards, accessibility, and inclusivity; developing methodological recommendations for selecting and integrating AI tools in vocational education; creating training programmes and courses for preparing educators to use AI in vocational education). Implementation and piloting (development and implementation of pilot projects using AI in vocational education across various fields and levels of training; evaluating the effectiveness of AI tools and their impact on student learning

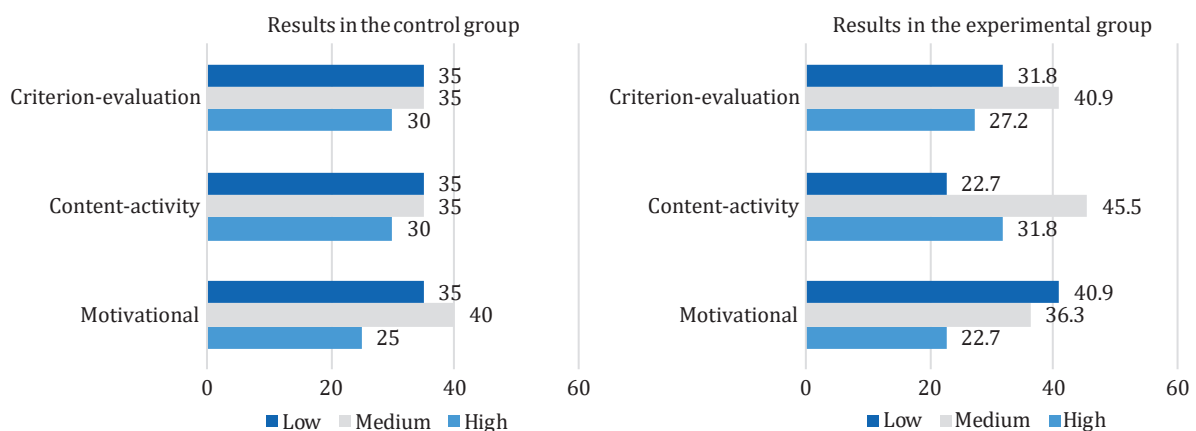
outcomes; adjusting methodological foundations and recommendations based on the results of pilot implementation). Scaling and dissemination (developing a strategy for scaling the use of AI in vocational education at national and regional levels; creating platforms and resources to support educators and students in using AI; ensuring cooperation with government bodies, employers, and other stakeholders to promote the use of AI in vocational education). Monitoring and evaluation (ensuring continuous monitoring and evaluation of the effectiveness of AI use in vocational education; collecting and analysing data on the impact of AI on learning outcomes, student motivation, and satisfaction of educators and employers; making adjustments to the methodology and practices of AI use based on the results of monitoring and evaluation).

The implementation of this system for improving the methodological aspects of using AI in vocational education is expected to result in enhanced quality and effectiveness of professional training, personalisation of the educational process and adaptation to the individual needs of students, development of new competencies and skills in students that meet the challenges of the modern labour market, increased motivation and engagement of students in learning, and improved collaboration between educators, students, employers, and government bodies. The use of AI has the potential to revolutionise vocational education and training, preparing professionals to meet the demands of economy. The proposed pedagogical system for improving the use of AI in vocational education can serve as a blueprint for developing and implementing effective AI strategies in this field.

AI is reshaping education, transforming it into a personalised and adaptive process. E-learning platforms like Enlearn employ machine learning to generate tailored learning paths that cater to the unique needs of each student. This approach not only

accelerates knowledge acquisition but also makes learning more engaging and effective. Learning Management Systems (LMS) are pivotal in driving this transformation. Beyond centralising educational processes, they foster collaboration between instructors and students. LMS enables organisations to create flexible and dynamic learning environments that meet the demands of the modern world. AI is revolutionising e-learning, transforming it from passive content consumption into an active engagement process. For Generation Z, who value self-directed learning and continuous growth, AI offers new avenues to achieve their goals.

Systems like ALEKS tailor education to the needs of each individual learner by assessing their knowledge and providing personalised assignments. The uniqueness of ALEKS lies in the fact that it does not simply deliver learning materials but creates a customised learning path for each student. The system first evaluates the student's knowledge level and then constructs a personalised plan that helps the student focus on crucial topics and reinforce new material. AI is used in education for various purposes, ranging from the creation of personalised learning plans (as seen in ALEKS and Squirrel AI) to the automation of routine tasks, such as grading homework (Holmes *et al.*, 2022). Consequently, following the initial diagnostic stage of the experiment, data was collected on the initial state use of AI systems in vocational education. AI programs were investigated, and their application methods were outlined. Subsequently, an experimental pedagogical system for using AI in vocational education was developed and implemented. The effectiveness of this AI-integrated pedagogical system in vocational education was evaluated by measuring the extent to which learners had developed specific components of readiness to use AI systems. The results of the distribution of respondents by their readiness to use AI at the stage of the formative experiment are presented in Figure 2.



**Figure 2.** Assessment results of vocational learners' readiness based on the defined components of the developed pedagogical system for using AI in vocational education, in both the control and experimental groups at the formative stage of the experiment, %

Source: created by the authors

Based on the results of the study, it was found that the updated methodology for the use of AI in vocational education is effective, as in the experimental group, during the formative stage of the experiment, the indicators increased to an average and high level compared to the data obtained at the diagnostic stage of the experiment. It was determined that students in the experimental group exhibited greater motivation to use AI in their studies. Factor analysis identified three primary factors influencing students' readiness to use AI: motivation, digital competence, and attitude towards new technologies. Regression analysis revealed that digital competence was the strongest predictor of students' readiness to use AI. Analysis of the survey results revealed that students in the experimental group, who participated in learning activities using SlideBot, Quizlet, DALL-E, Gemini, and ChatGPT, demonstrated a significantly higher level of knowledge about the principles of AI and its potential applications in education compared to students in the control group. The use of AI in research opens up new possibilities for improving efficiency and quality. To ensure academic integrity, clear guidelines must be followed. Plagiarism, data falsification, and using AI for mass production of low-quality publications are unacceptable. Every researcher must independently analyse the results obtained using AI and ensure proper citation of all sources used, including AI data and algorithms. It is crucial to consider the potential risks associated with algorithmic bias and data privacy.

Therefore, AI is closely linked to open, contemporary science through its work with big data. It organises information, analyses it, and facilitates further research. In education, AI can serve as a teaching assistant, creating personalised learning experiences. However, there are risks: diminishing the role of the teacher, reducing the creativity of learners, and exacerbating the digital divide. In the training of future professionals in vocational education, AI systems can personalise learning, providing a tailored approach for each student. In science, AI automates routine tasks, analyses large datasets, and assists in generating new hypotheses. However, it is important to understand that AI does not replace human intelligence but is rather a powerful tool. To effectively utilise AI, ethical standards must be developed and potential risks, such as diminishing the role of teachers in education and potential biases in AI algorithms, must be considered. AI has the potential to revolutionise education by making it more personalised, efficient, and accessible. However, it is crucial to understand that AI does not replace the teacher but acts as a powerful tool. The key to successful AI implementation in education lies in a judicious combination of technology and human expertise.

## ■ Discussion

Ukraine aspires to become a leader in the field of AI. To achieve this goal, an ambitious eight-year strategy

(2023-2030) has been developed. It outlines a phased implementation of measures under government oversight. The legal foundation for the strategy is provided by the country's constitution and a series of specialised laws. This document will serve as a roadmap for AI development in Ukraine, as state programs will be developed and new laws enacted based on it (Resolution of the Cabinet of the Ministers of Ukraine No. 286-2022-p, 2022). The presented document substantiated the urgent need for a transformation of educational programs in Ukraine to cultivate highly skilled professionals in the field of AI. According to the proposed strategy, the integration of AI elements into school curricula and higher education programs is envisioned to foster a foundational understanding and interest in this field among the youth. The establishment of specialised undergraduate, graduate, and doctoral programs focused on training AI researchers and engineers is a pressing requirement. There is a need to develop online courses, mobile applications, and other interactive tools for distance learning and professional development, as well as to intensify collaboration between universities and IT companies to develop joint curricula, internships, and research laboratories. Inviting leading global AI experts to deliver lectures, seminars, and conduct joint research is essential. Securing stable funding for AI research projects from both government budgets and private investments is crucial (Crompton & Burke, 2023).

The expected outcomes include enhancing Ukraine's competitiveness in the global technology market, creating new jobs in high-tech sectors, accelerating the development of an innovation-driven economy, and strengthening the country's scientific capacity. Key advantages of the proposed strategy are: encompassing all levels of education from school to postgraduate studies, emphasising the acquisition of practical skills and innovation implementation, uniting the efforts of experts from various fields, and integrating Ukraine into the international scientific and educational landscape. The implementation of this strategy will enable Ukraine not only to catch up with global leaders in AI but also to become a hub for global innovation (Uzwyszyn, n.d.).

In examining the application of AI in education, I. García-Martínez *et al.* (2023) identified the core features of AI. They have furthered the argument for the integration of AI into vocational education, citing it as a necessity in today's increasingly digital society. This approach is deemed appropriate as AI systems employ sophisticated algorithms to analyse and interpret data from various sources, including text, images, audio, and sensory data. They are capable of learning from experience and improving their performance over time. This is often achieved through machine learning, which involves the automatic identification of patterns in data without explicit programming. AI systems can make autonomous decisions based on the data they analyse and the knowledge they acquire. They can perform a

variety of tasks, such as image recognition, machine translation, text generation, planning, and navigation.

S.Z. Salas-Pilco & Y. Yang (2022) extensively explored methodologies for integrating AI into the training of future professionals. The researchers identified several types of AI: narrow (focused on performing a specific task or set of tasks, such as facial recognition or playing chess), general (possessing general cognitive abilities), and superintelligence (surpassing human intelligence in all aspects). The utilisation of this classification is deemed appropriate as the developed AI methodology incorporates these identified types. The implementation of this methodology is highly relevant given the anticipated emergence of “digital universities” in the near future, which will be grounded in virtual reality and AI. This underscores the active integration of digital technologies into educational transformation. Considering challenges related to technological infrastructure, the primary task becomes transforming the education system to overcome these obstacles. To this end, numerous educational resources and digital platforms are being developed to support and create educational content.

The research by O. Yara *et al.* (2021) was based on the concept of adaptive learning, which involves the continuous modification of the educational process according to the individual achievements of higher education students. Analysis of the research findings revealed that the next phase of machine learning algorithm development enables AI systems to analyse vast amounts of data, identify patterns, and predict the future progress of each student. The authors demonstrated that AI in professional education can not only automate routine tasks for educators but also facilitate a deeper understanding of the educational process.

For instance, H.-C. Chu *et al.* (2022) in their numerous studies have highlighted that higher education learners’ readiness to effectively use AI is a complex phenomenon encompassing not only technical skills but also understanding, attitude, and willingness to adapt to the changes brought about by AI development. Technical skills include understanding the fundamental principles of artificial neural networks, machine learning, deep learning, and other key concepts; proficiency in programming languages used for developing AI models (such as Python, R, and Java); ability to work with various tools and platforms for creating, training, and deploying AI models (like TensorFlow, PyTorch, and Google Colab); and skills in collecting, cleaning, processing, and analysing data for training AI models. Digital literacy encompasses knowledge of contemporary digital technologies and their applications in various fields, confident use of computers, the internet, and a variety of software products, the ability to critically evaluate information from diverse sources, and the detection of misinformation. Soft skills encompass the ability to generate novel ideas and unconventional solutions, analyse information, identify errors, and

make informed decisions. They also include effective communication, teamwork, and presentation skills, as well as an understanding of the ethical implications of AI and the responsibility for one’s actions. Understanding the potential and limitations of AI involves recognising potential negative consequences (such as job displacement and algorithmic bias), evaluating AI model performance, and identifying their shortcomings. Readiness to collaborate with AI entails understanding that AI is a tool to assist humans rather than replace them, and the ability to adapt to new ways of working enabled by AI. Developing these components in higher education students is a crucial task for universities and educational institutions. This will enable the training of professionals in vocational education who can effectively utilise AI to solve complex problems and contribute to the growth of an innovative economy.

K. Alhumaid *et al.* (2023) argued that several models exist in contemporary research to describe the future development of AI. Some of these models include exponential growth (predicting that AI development will accelerate at an ever-increasing pace); S-curve (suggesting that AI development will follow an S-shaped curve, initially slow, then rapid, and finally slowing again); and technological singularity (postulating that AI will eventually surpass human intelligence, leading to radical societal changes). The use of these models is deemed appropriate as they are reflected in the presented research on methodological aspects of using AI in vocational education. The application of AI in vocational education offers numerous advantages. AI systems enable the creation of personalised learning plans that cater to the individual needs and learning styles of each student. They can automate many tasks, freeing up educators’ time for more creative interactions with students. AI can make education more accessible to students with diverse abilities. AI is becoming an increasingly powerful tool for enhancing education. Due to its capabilities in personalisation, automation, and accessibility, AI has the potential to revolutionise the field of education.

## ■ Conclusions

AI is increasingly being integrated into education, offering new opportunities for personalised learning and the automation of routine tasks. The widespread use of AI has raised concerns about its impact on the role of educators, the development of students’ creativity, and the widening of the digital divide. The research demonstrated that ensuring the quality of the educational process for vocational education students in Ukrainian higher education institutions relies on high-quality methodologies for organising work with AI programs.

AI has been identified as a driving force behind global change. Its impact is felt across all spheres of life, from economics to culture. This research defined the concept of AI and explored its characteristics and

features. A methodology for integrating AI into the training of vocational education specialists was presented. A pedagogical system has been developed to foster readiness for the use of AI among vocational education students. This system consisted of three interconnected components: motivation-goal, cognitive-activity, and results-evaluation.

A comprehensive analysis of the scientific literature has enabled the systematisation of understanding regarding the application of AI systems in vocational education, and the identification of the key components of a methodology for addressing this issue in the training of future specialists. To empirically verify the effectiveness of the proposed pedagogical system for developing the readiness of professional education students to use AI, both diagnostic and formative experiments were conducted, during which appropriate diagnostic methods were employed.

Promising areas of research on the use of AI in the educational process include the study of the ethical aspects

of AI in education (developing ethical principles for the use of AI in education, ensuring fairness and preventing discrimination); data protection (developing effective methods for safeguarding students' personal data used by AI systems); human-AI collaboration (researching optimal models of interaction between humans and AI in the educational process); the development of detailed methodological guides and instructions, creation of specialised courses and training programmes, development of university standards and ethical codes, collaboration with IT companies and research institutions, systematic evaluation of effectiveness, and the establishment of a community of practitioners.

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None.

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## Методичні аспекти використання штучного інтелекту в підготовці майбутніх фахівців з професійної освіти

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■ **Анотація.** Штучний інтелект здійснює значний вплив на трансформацію освіти, науки та суспільства, позначаючи новий етап у розвитку технологій. Його активна інтеграція в освітній процес сприяє підвищенню рівня інтерактивності та персоналізації навчання. Мета статті полягала у дослідженні методичних основ застосування систем штучного інтелекту в професійній освіті та експериментальній перевірці педагогічної системи формування готовності майбутніх фахівців з професійної освіти до використання штучного інтелекту. Теоретично доведено необхідність удосконалення методики впровадження програм на основі штучного інтелекту у професійній освіті та визначено перспективи використання запропонованої методики для вдосконалення підготовки майбутніх фахівців з професійної освіти в умовах освітніх трансформацій. Визначено зміст поняття «штучний інтелект» та розкрито його головні ознаки і особливості. У цій роботі представлено методику впровадження систем штучного інтелекту у підготовку майбутніх фахівців з професійної освіти. Визначено перспективні напрямки удосконалення реалізації освітніх програм підготовки майбутніх фахівців з професійної освіти з використанням систем штучного інтелекту та надано рекомендації з методики їх застосування. У контексті реалізації даної методики у процесі реалізації освітньо-професійної програми другого (магістерського) рівня вищої освіти «Професійна освіта (Цифрові технології)» при викладанні дисципліни «Цифрові інструменти у професійній освіті» було застосовано наступні сервіси штучного інтелекту SlideBot, Quizlet, DALL-E, Gemini, ChatGPT. Було запропоновано педагогічну систему формування готовності майбутніх фахівців з професійної освіти до використання штучного інтелекту, яка включає наступні етапи: аналіз та визначення потреб, розробка методологічних засад, впровадження та пілотування, масштабування та поширення, моніторинг та оцінка. Представлена педагогічна система ґрунтується на трьох взаємопов'язаних компонентах формування готовності, а саме: мотиваційно-цільовий, когнітивно-діяльнісний та результативно-оцінний. Оцінка ефективності представленої педагогічної системи здійснювалася за трьома рівнями: високий, середній та низький

■ **Ключові слова:** цифрові технології; педагогічна система; освітні трансформації; формування готовності; інтерактивність навчання

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